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REVIEW ARTICLE

THE AGRONOMY AND PRESENT POSITION OF OIL-SEED CROPS IN SCANDINAVIA—A REVIEW OF THE LITERATURE

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INTRODUCTION

Although oil crops have been grown in Scandinavia for long intervals since the 19th century (1, 4, 32), this review deals only with the present period which began during the Second World War. Articles which are referred to in other reviews or more recent papers are in most cases not included in the bibliography, which thus mainly consists of recent works or earlier reviews relevant to this one.

The aim of the review is to give an outline of the cultivation of oil crops in Scandinavia, and to assess their importance to the Scandinavian nations.

SWEDEN

SPECIES GROWN, THEIR YIELDS AND RELATIVE IMPORTANCE IN DIFFERENT REGIONS

In the early 1940's most of the area under oil crops was confined to southernmost Sweden and many different species were grown (see Table 1). Severe winters had caused heavy over-wintering damage in the winter-sown types and it was held that these species were not hardy enough for Central Sweden (32). That was why, up to 1950, the spring-sown species occupied such a large part of the total oil-crop area. After a few years it became obvious that it was not economical to grow the following species : soyabean (*Glycine max*), sunflower (*Helianthus annuus*), poppy (*Papaver somniferum*) and brown mustard (*Brassica juncea*). Over the years, the area under oil crops has been extended northwards and research has shown that the winter types were well adapted to the plains of Central Sweden (the region round the big lakes). Winter turnip rape (*Brassica campestris oleifera* sub. var. *biennis*), which had been grown only to a small extent in the 1940's proved to be well suited to northwestern Götaland and Svealand (compare Finland, below).

During the 1950's the winter types have held their position (Table 1) but the spring-sown ones show a decline up to 1955 since when the acreage has remained low and constant. The reason for this is that as farmers have become accustomed to the growing of oil crops they have realized more and more that the winter varieties are to be preferred to the spring-sown ones. Generally speaking, winter rape (*Brassica napus oleifera* sub. var. *biennis*) can be regarded as the best species for southern and eastern Götaland, whereas winter turnip rape is better adapted to large areas of north-western Götaland and Svealand (25). The average yields for Sweden are given in Table 2.

However, it is not always possible to fit winter types into the rotation and so the spring-sown ones must be grown to a certain extent. Of the latter, summer rape (*Brassica napus oleifera* sub. var. *annua*)

TABLE 1

Harvested area of oil crops in Sweden in the years 1940-58 (in 1000's of hectares)

	1940	1942	1944	1946	1948	1950	1951	1952	1954	1955	1957	1958	1959*
Winter rape	0·06	1·4	11·9	5·4	14·3	60·2	85·5	64·5	57·4	57·7	52·5	49·3	51·9
Winter turnip rape	—	—	—	0·4	1·0	5·8	14·4	20·4	17·3	16·8	19·7	14·7	25·4
Summer rape	—	0·2	8·7	6·9	23·6	50·2	32·6	15·8	4·6	2·4	2·1	5·1	—**
Summer turnip rape	—	—	—	—	—	7·0	10·8	3·9	1·5	0·7	0·5	1·9	—
White mustard	—	14·0	7·7	5·2	18·0	6·6	11·1	17·2	8·2	6·0	4·9	4·5	—
Brown mustard	—	—	—	0·04	0·1	—	—	—	—	—	—	—	—
Poppy	0·1	0·7	2·8	0·3	—	—	—	—	—	—	—	—	—
Linseed	0·2	1·8	13·3	8·7	21·7	34·9	20·8	17·8	2·2	0·3	0·9	1·0	—
Sunflower	—	0·04	0·03	—	—	—	—	—	—	—	—	—	—
Soyabean	0·02	0·04	—	—	—	—	—	—	—	—	—	—	—
Camelina	—	—	—	—	—	—	0·08	1·0	—	—	—	—	—

* sown area.
** data for spring-sown species not yet available.

is preferred in western Götaland and the Mälar-Hjälmare region. White mustard (*Sinapis alba*) can be used as a prop plant for peas and vetches grown for their seed in S. Sweden (28). Summer turnip rape (*Brassica campestris oleifera* sub. var. *annua*), which ripens about 90 days after sowing, is the only suitable oil crop for peat soils and the northern regions of the country. False flax, *Camelina sativa*, which is the most drought-resistant of all, gives the best results in the eastern regions of South and Central Sweden.

AGRONOMIC RESEARCH AND CULTIVATION TECHNIQUE

When, during the Second World War, the growing of oil crops had become important for the production of fat in Sweden and it became urgent to arrive at a cultivation technique based on the results of experiments, a special committee was appointed to handle this research work on behalf of the growers' organisation. In the years 1948–53, 2482 trials were carried out. Of these 1029 were on manuring and 858 were variety tests (17). Besides this, much research work has been carried out by different Swedish institutions and institutes. Among the latter, mention should be made of the Swedish Seed Association at Svalöf, where the main part of the breeding of new varieties has taken place.

The results and the experience gained through research have been of immediate benefit to the growers. From the trials carried out to date, the following conclusions can be drawn (17), (39) :

Sowing date. Winter rape should be sown about 10–20 August in southern Sweden, and about a week earlier in central Sweden. Winter turnip rape can tolerate being sown about 10 days later than winter rape. Spring-sown oil plants, when sown later than the correct date, always give lower yields and a lower oil content than if they had been sown as early as possible in spring.

Seed rate. For most cruciferous plants there seems to be little effect on the average yield, whatever amounts of seed, between 4 and 12 kg per ha, are used. However, the density of the stand of the winter types is sometimes a deciding factor in the successful overwintering of the crop (41, 27). The following seed rates may be considered as standard for the best conditions of germination and emergence (all figures refer to kg per ha) : rape 6 – 8, turnip rape and *Camelina* 5, white mustard 12. These rates should be increased if conditions are not optimal (e.g. delayed sowing, poor soil structure).

Spacing. A suitable distance between the rows for the Brassica species seems to be 40 – 50 cm.

TABLE 2

Seed yield of various oil crops in Sweden 1941-58

(kg/ha ; 18% moisture content)

Years	Winter rape	Winter turnip rape	Summer rape	Summer turnip rape	White mustard	Linseed	Poppy	Camelina
1941	1523	—	—	—	1145	691	509	—
1942	1981	—	1518	—	1279	1122	892	—
1943	2432	—	1290	—	1203	1389	777	—
1944	1508	—	979	—	974	1285	806	—
1945	1459	1117	1075	—	958	1419	740	—
1946	1796	1188	1009	—	1072	945	554	—
1947	1091	834	1336	—	1196	1139	294	—
1948	2125	1023	1161	959	1130	1472	—	—
1949	2002	1091	1264	929	1044	1202	—	—
1950	1804	1210	1317	899	1017	1252	—	1603
1951	1842	1207	1212	744	1301	1201	—	900
1952	2158	1627	1656	658	1260	1056	—	—
1953	1996	837	903	705	1216	1094	—	—
1954	2277	1603	1300	816	1104	895	—	—
1955	1972	1583	879	703	1311	1126	—	—
1956	1638	1216	1506	1124	1409	1714	—	—
1957	2680	1960	1215	625	1235	1390	—	—
1958	1850	1290	1035	625	720	1100	—	—

Cutting off the tops of winter rape in autumn for fodder has been proved to decrease the yield very considerably and should not be practised.

Harvesting and the method of harvesting are very important not only for the seed yield but also for its oil content (26). The harvest should take place when the pods and stalks are quite dry and the seeds are black and firm. In windy regions the rape should be cut, and left to ripen in the swath, before full maturity is reached, i.e. at the stage when pods are yellow but still so firm that seeds are not shed. Turnip rape and especially white mustard are more resistant to seed-shedding than rape, and can always be combine-harvested whilst standing (26).

The value of oil crops in the rotation has been studied in some trials. Oil plants have proved to be very valuable as a preceding crop to cereals but not to sugar-beet, since Brassica species favour beet

eelworms. Herbage crops seem to be the best preceding crops for winter oil plants.

Fertilizers. The need of a crop for added nutrients is always dependent upon the status of the soil. The average values obtained from trials, therefore, indicate the general fertilizer requirements of different oil crops grown under Swedish conditions. Available data indicate , for cruciferous oil plants, a very high requirement for nitrate — up to 1000 kg per ha of a nitrate containing 15·5% nitrogen for the winter types and somewhat less for the spring-sown ones. The trials indicate no differences in varietal reponse to various nitrogen amounts (8).

Among other nutrients, the need for phosphorus seems to be about the same in cruciferous oil crops as in cereals, while the need for potassium is rather less than in cereals.

For winter oil plants the dressing of nitrate should be given as early as possible in spring. For spring-sown types all fertilizers should be given before sowing, as is the case with potassium and phosphorus for the winter types.

Fungus pests. Fungus pests have not been a big problem for Swedish oil-seed growers. Heavy attacks have sometimes caused considerable losses to some farmers, but the average reduction in yield has been much less than that caused by insects. Among the fungus diseases the following only are worth mentioning (29) : *Alternaria* spp. (*A. brassicae, A. circinans* and others) which are fairly frequent in Sweden. These fungi cause scattering of the seeds if the weather is moist and warm towards the harvest period, and reduce the seed size. *Botrytis cinerea* is of importance mainly as a secondary infection where *Alternaria* and the rape weevil (*Ceuthorrynchus assimilis*) are the primary ones. *Peronospora brassicae* occurs frequently but the attack is generally mild. The blasting of the cotyledons of winter rape shortly after emergence in autumn is sometimes of importance in the further development of the crop.

Plasmodiophora brassicae occurs sporadically in limited areas only but the destruction of the plant is often complete. *Sclerotinia* spp. and *Typhula* spp. are important only in the northern regions where the autumn-sown species are covered by snow for a long time (compare Finland below).

Insect pests. Insect pests, which caused the total interruption of the growing of rape in Sweden in the 19th century, are of very great economic importance not only because they reduce yields but also because they increase the cost of cultivation, since treatment is very often necessary. Without insecticides, the intensive growing of oil crops in Sweden would probably not have been possible.

Among the insect pests, the following should be mentioned (31, 7) : *Phyllotreta* spp., which attack the young Brassica plants shortly after emergence and *Psylloides chrysocephala*, which is sometimes dangerous to winter rape and turnip rape as the larvae live inside the plants during winter. These insects, however, are easily killed with DDT. *Athalia colibri* occurs sporadically, but in some autumns it has caused considerable damage to winter rape. The attack is often limited to the borders of fields and generally one treatment with parathion is sufficient. The most dangerous insects in the spring and summer are *Meligethes aneus, Ceuthorrhynchus assimilis* and *Dasyneura brassicae.*

Meligethes destroys the buds of rape, turnip rape and white mustard. *Ceuthorryhynchus* makes holes in the pod walls. *Dasyneura* use these holes for inserting their eggs into the pods. *Dasyneura* is probably the most dangerous insect in rape and turnip rape (white mustard is not attacked) since often almost-ripe pods are destroyed and the plant is not able to compensate for such late destruction. Evolution in *Dasyneura* is very rapid and two generations occur in winter rape. If summer rape is grown in the same region, a third generation can attack this crop. This fact caused a recession in the summer-rape area in the early 1950's once the danger was realized of growing winter and summer types of rape side by side. The killing of *Meligethes* is no problem since DDT is effective and treatment takes place before flowering. *Ceuthorrhynchus* is more difficult to control ; parathion and HCH are effective but the attack sets in during flowering and bees will also be killed if these insecticides are applied. In countries where parathion and HCH are not prohibited during flowering, treatment can take place at night and the bees which visit the fresh flowers in the morning will not be harmed. Also it is possible to treat swarming *Dasyneura* with DDT, but this treatment must be carried out at just the right moment.

Breeding work and varieties of importance. Breeding work with oil-seed crops was undertaken in Sweden in the years 1918–23 (1, 2). During and after the Second World War breeding work was intensified and resulted in the marketing of new improved varieties. Of the species which from the beginning had not been subject to a breeding programme, e.g. summer turnip rape, the improvement in yield has been very great — about 30%. Varieties of importance on the market at present are : Svalöf Matador winter rape (2), Hammenhög Vestal winter rape (30), Svalöf Duro and Svalöf Rapido II winter turnip rapes (9), Svalöf Regina II summer rape (5), Svalöf Bele summer turnip rape (13), Svalöf Primex White mustard (3) and Svalöf's *Camelina.*

Of the different species of cruciferous oil plants, only *Camelina* is autogamic. Turnip rape and white mustard seem to be completely allogamic and rape is one-third allogamic (37, 12). The wind plays an important role in the transmission of the pollen (38). Considering this fact, it is easy to realize that new improved varieties of oil crops very soon change

their characters and tend to lose their valuable qualities. That is why, for all varieties, new élites must be issued every second or third year. A large part of the breeding work consists in the selection and isolation of élites (12).

OIL CONTENT AND QUALITY OF OIL

The oil content of cruciferous oil-seed crops grown in Scandinavia is fairly high. Little research work has been done on the problem of the influence of latitude on oil content, but available data indicate that differences in oil content between regions are due to other factors than latitude (32). The winter types also have a higher content than the spring-sown ones. Under the conditions of S. Sweden the oil contents can be considered as normal for the material grown at present.

OIL CONTENT, AS PERCENTAGE OF DRY MATTER

Winter rape ...	47	Brown mustard ...	38
Winter turnip rape	45	Poppy	47
Summer rape ...	42	Linseed	44
Summer turnip rape	42	Camelina ...	40
White mustard ...	31		

Since cruciferous oil seeds contain very little carbohydrate, there is consequently a very high negative correlation between oil content and protein content (12). However, the most valuable substance is the oil and species and types with a high oil content are preferred (10, 36).

Much research work is going on all over the world to find out the relative values of different fatty acids in the human diet. In practice no evidence has come forward which excludes the possibility of using only rape oil as a source of fat, and, in case of war, the authorities are prepared to base the fat industry entirely upon oils produced within the country (4).

Poppy oil is considered the most valuable among those which could be produced in Sweden and white mustard oil is of special value for certain purposes, e.g. salads and mayonnaises (4). However, poppy and to some extent white mustard are low yielding and their oils are more expensive to produce.

PRICES OF SEED. PRICE SYSTEM

In early years, the prices of different oil-seed crops were fixed by the Government. In the beginning of the 1950's this practice was abandoned and prices were regulated according to a special system which was influenced by world market prices (32). At the same time, research was carried out in order to estimate the variation in oil content between different fields and different regions. According to this investigation there is a rather wide variation, especially between fields and between regions. In some cases the variation is about 15% and consequently there is good reason for paying for the seed on its oil content. From 1957, a new price system has been applied based on the oil content of the seed delivered (22, 32).

HANDLING OF THE SEED. ORGANISATIONS

Most of the oil seed must be dried after harvest. In recent years many farmers have built their own driers but central drying plants still handle most of the crop. If necessary, the seed is cleaned by the central drying plants before it is transported to the oil mills.

Since the beginning, the oil-seed growers have had their own organisation. The seed has been grown on contract and, in the early years, the contracting and the handling of the seed, as well as its sale, were managed by a central organisation formed by an association of the local organisations. In the beginning of the 1950's a special organisation, " Sveriges Oljeväxtintressenter " was established, formed by members appointed by the growers' organisation, the government, the oil industry and certain other organisations. This organisation has taken over many of the functions of the former Central Grower's Organisation (32).

THE USE OF THE PRODUCTS. OIL AND MEAL

The oil mills extract the fat from the seeds and after being refined, the oil is used mainly as a component in margarine. The oil of white mustard is, as mentioned before, used for special purposes, e.g. for mayonnaise. At present about one-third of the fat of Swedish margarine comes from oil seeds grown within the country.

The meal residue left after extraction is used for stock feed. The results of feeding trials show that the quality of this Swedish meal is very good.

AGRICULTURAL POLICY

During and immediately after the last war the most important reason for growing oil-seed crops in Sweden was the shortage of fat. After the war, when this shortage was not so pronounced, it was said that their cultivation should be maintained so that, in case of war, farmers would be able to produce the fat needed. Now there is no fat shortage in the world and the importance of being prepared is less discussed. Instead there is another important reason for maintaining oil-seed crop production, and that is that the structure of Swedish agriculture has greatly changed, so that the oil-seed crops in the rotation are now more necessary than ever before (32). Because of this the authorities wish to protect and encourage the growing of oil-seed crops.

FINLAND

Oil plants were not grown in Finland until World War II. In 1942 some oil-seed flax was sown and some years later other spring-sown oil plants were grown on small areas (43). Since 1951 the

cultivation of turnip rape has been of great importance in Finland as can be seen from Table 3. Only

TABLE 3

The cultivation of winter turnip rape in Finland in the years 1948-58. Area, percentage of total area of oil plants and seed yield.

Year	Turnip rape area (ha)	Per cent of total area of oil plants (%)	Seed yield per hectare (kg)
1948	11	0·3	1200
1949	38	0·7	1100
1950	200	2	1360
1951	5000	30	1280
1952	13200	67	1521
1953	17380	87	1345
1954	15080	100	891
1955	16000	100	1124
1956	11516	100	850
1957	7000	100	772
1958	8800	100	1475

very small areas were sown with this crop before the beginning of the 1950's. From 1954, however, turnip rape has been the only species grown since practical experience has shown that this crop was the most suitable one for Finnish conditions (42). As in Sweden, research work has been carried out to ascertain the best cultivation techniques. Most of the results from these trials are given in the periodical *Kasviöljy*, and only research, which is not covered by similar Swedish experiments, is referred to in the bibliography.

Among the problems which are more important in Finland than in Sweden can be mentioned the fungus pests, which develop under the snow cover, the destruction of the crop by standing water, and the lack of trace elements (19, 20, 21, 24, 40). To prevent damage by standing water a special technique consisting of sowing on ridges has been worked out (33).

As is the case in Sweden, the sowing date is of great importance. Sowing must take place in southern Finland as early as the last 10 days of July and somewhat earlier than this in northern Finland.

The hardy Swedish variety Svalöfs Rapido turnip rape can be grown over the whole area. The German variety Gruber is not so hardy but has also been grown (23).

Because of the short summer, winter turnip rape is generally sown after fallow.

Sowing methods have, in recent years, been somewhat different from those applied in Sweden. Thus, some farmers leave about 24 cm between the rows and the crop is not hoed. This method can be adopted when land is used that was previously fallow. On soils where weeds threaten the crop, greater distances between the rows (40–60 cm) are recommended ; where standing water is a problem, turnip rape is sown on ridges about 50 cm apart (33).

Most of the pests which are of importance in Sweden occur in Finland as well, but protection against them has not been a great problem.

In recent years more and more of the turnip-rape area has been harvested by combine-harvester (24).

The growers of turnip rape in Finland have established one factory, Växtolje AB, in which the oil is extracted and refined. The factory consists of silos for storing seed, a department for pressing the seed and extracting the oil and one for refining the oil. About 40% of the oils used in Finnish margarine come from turnip rape. Turnip-rape oil is also used as an edible oil in Finland.

DENMARK

Oil crops were grown in Denmark in the 18th century. In 1866 the area of rape was reported to be 15,500 ha but some years later the area had decreased to just 100 ha (16). Towards the

TABLE 4

The acreage of oil-seed crops in Denmark in the years 1939-58.

(In 1000's of ha.)

Years	Winter rape	Summer rape	White mustard	Linseed	Oil poppy	Total area of oil crops
1939	—	—	2·96	—	—	2·96
1940	—	—	5·67	2·70	—	8·37
1941	—	—	7·80	3·40	0·10	11·30
1942	—	—	18·50	3·50	0·10	22·10
1943	—	—	16·10	2·60	0·23	18·93
1944	—	—	15·20	3·80	0·40	19·40
1945	—	—	13·30	2·60	0·87	16·76
1946	—	—	7·63	1·16	1·42	10·21
1947	—	—	14·60	9·29	0·93	24·82
1948	—	—	11·75	18·13	0·53	30·41
1949	0·66	0·04	3·37	12 15	0·29	16·51
1950	1·19	0·58	4·30	14·62	0·43	21·12
1951	5·05	1·18	13·87	10·09	0·17	30·36
1952	10·70	2·20	5·50	5·90	0·05	24·35
1953	13·84	1·79	4·11	1·97	—	21·71
1954	12·00	1·00	6·00	1·40	—	20·40
1955	1·94	0·79	7·20	0·79	—	10·72
1956	0·80	0·70	4·00	1·10	—	6·60
1957	0·70	0·30	2·40	1·70	—	5·10
1958	3·70	0·60	4·40	1·50	—	10·20

end of World War I the area of white mustard was considerable (see Table 4). In World War II it was the most important oil crop. At the beginning of the 1950's winter rape was for some years an important crop but from 1955 the area of rape and other oil crops has been rather small.

In Table 5 average yields of oil crops during 1939–58 are given. For comparison, the average yields of summer barley — a very important crop in Denmark — are also given. The yields are about the same or somewhat lower than for Sweden.

TABLE 5

Seed yields of various oil crops in Denmark in the years 1940-58.

(kg/ha ; 18% moisture content)

Years	Winter rape	Summer rape	White mustard	Linseed	Oil poppy	Summer barley
1940	—	—	—	1210	—	2130
1941	—	—	720	660	—	2480
1942	—	—	870	1020	—	3410
1943	—	—	1020	1180	—	3360
1944	—	—	980	1210	670	3280
1945	—	—	930	1550	670	3200
1946	—	—	880	1100	670	3460
1947	—	—	840	1300	620	2990
1948	—	—	900	1470	500	3430
1949	1850	1490	970	1350	560	3560
1950	1550	1280	920	1130	430	3390
1951	1900	900	1000	1150	460	3520
1952	2190	1090	1080	1120	490	3940
1953	1490	1350	930	1050	—	3640
1954	1040	990	790	960	—	3480
1955	1450	1000	990	1300	—	3720
1956	1640	1240	1040	1450	—	3840
1957	2540	1400	1180	1260	—	3840
1958	2120	1150	910	1030	—	3620

When comparing the area and prices of oilseed crops it is quite obvious that the price has influenced the area sown.

Research has been carried out in Denmark ; especially on the techniques of growing white mustard and poppy. Similar results to those in Sweden have been obtained (14, 15). Varieties of oil crops have been tested but the differences between them have been small (35).

NORWAY

Since Norway produces plenty of animal fats, mainly oil from fish and whales, the need for vegetable fats has never been so great as in the other Scandinavian countries. This fact, together with the different agricultural structure, has resulted in oil plants not being grown in Norway.

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FIELD CROPS

CEREALS

WHEAT

See also Abs. 386, 391, 392, 393, 397, 404, 434, 450, 454, 455, 457, 473, 490, 525, 531.

1 GHISLENI, P. L. Risultati di esperienze quadriennali su le relazioni intercorrenti tra la concimazione azotata e l'epoca di semina del frumento. **[Results from trials over 4 years to study the relationship between N manuring and sowing date in wheat.]** *Concimi e Concimaz.* 1959, No. 1, pp. 7, bibl. 16. [Ist. Agron. Univ. Torino, Italy]

In the trials described wheat was sown in mid-Oct. (normal date) and 25–30 days later. Results (tabulated) showed that, although delayed sowing resulted, on average, in reduced yields of grain and straw, this effect was largely compensated by the application of N fertilizers.—E.B.O.

2 SÉGUÉLA, J. M. Enseignements techniques à tirer de la campagne de céréales 1956–57. **[Technical information to be drawn from the cereal season 1956-7.]** *Tunisie agric.* 1958, Jan.-Feb., pp. 27. [Serv. Bot. Agron., Tunisia]

Information is given on the growing of soft wheat and durum wheat in Tunisia, mainly as crop areas, yields, varieties and cultural methods are concerned.—E.B.O.

3 DREZGIC, P. and JEVTIC, S. **Influence of the depth of ploughing on the development of the root system, soil moisture and winter wheat yields on chernozem soil.** *Rep. World Congr. agric. Res., Rome,* 7–9 May, 1959, pp. 8, French, German, Spanish and Italian summaries. [Inst. Agric. Res., Novi Sad, Yugoslavia]

The results from trials on chernozem soil in 1957–8 confirmed that deep ploughing (to a depth of 45 cm.), repeated several times and followed each time by the application of chemical fertilizers, increases wheat yields considerably and has a favourable effect on the development of the root system and the conservation of soil moisture. F. s. —E.B.O.

4 YANKOVITCH, L. Les cases lysimétriques du Service Botanique et Agronomique de Tunisie. Résultats de vingt années d'expérimentation sur la fertilité des sols. **[The lysimeters of the Service Botanique et Agronomique of Tunisia. Results from 20 years' trials on soil fertility.]** *Tunisie agric.* 1957, May, pp. 14. [Received May, 1959]

An account is given of trials to study different rotations in which wheat was the principal crop. Information was obtained on : water losses through evaporation and drainage ; amount of rainfall required by different types of rotation ; N losses ; and nutrient requirements. Results showed that in regions receiving 450 mm. annual rainfall, wheat can be grown without interruption for 3–4 years at least, provided that fertilizers are applied and weeds kept in check.—E.B.O.

5 TATTERSFIELD, J. R. **[Wheat.]** *Fld Crop Expts, Gwebi 1954/5-1956/7* [cont. in] *Rhod. agric. J.* 1959, **56**, No. 1, 17.

In investigations of the effect on wheat of different row-spacings, sowing-rates and weeding, increasing the seed rate from 50 to 75 lb./ac. increased the yield. Increasing the row-spacing from 7 to 14 or 21 in. lowered the grain yield and increased the incidence of lodging.—M.A.

6 THOMPSON, E. G. and HENDERSON, C. F. **Effect of seed treatment with insecticides on rate of seeding wheat.** *J. econ. Ent.* 1959, **52**, No. 3, 535, bibl. 1. [Ent. Res. Div., Agric. Res. Serv., USDA]

Seed of Triumph wheat treated with 18·2 or 27·3 oz. of 44% thimet dust/100 lb. seed, and seed of Comanche wheat treated with 4 lb. of 50% dieldrin or 7 lb. of 40% aldrin/100 lb. seed, were tested in a stationary seed-drill to determine the effect of seed treatment on sowing rate. Thimet treatments resulted in 4% and 5·3% reduction in bushel weight, and 15·2 and 21% reduction in sowing rate, compared with untreated controls. Dieldrin treatment reduced bushel weight and sowing rate by 2·9 and 9·3%, and aldrin treatment by 4·1 and 13·1%, respectively. Germination was not affected by any of the treatments. [See also *Fld Crop Abstr.* 12 : 837.]—R.B.

7 MCEWAN, J. M. **The wheat varieties of New Zealand.** *Bull. 131 N. Z. Dep. Sci. Industr. Res.* 1959, pp. 36, bibl. 19, illus.

Following an historical review of the wheat varieties of N. Zealand, there is a classification, with annotated description, of the following varieties : College Hunters, College Solid Straw Tuscan, Dreadnought, Cross 7, Tainui, Fife-Tuscan, Yielder, Hilgendorf, Arawa, Aotea, and Gabo. Their classification in the FAO catalogue of genetic stocks is shown.—M.H.

8 Casale Buonoconto, Bianca. Qualità plastiche di alcune cultivar di *Triticum durum* del raccolto 1956. [**Plastic qualities of some cultivars of *T. durum* of the 1956 harvest.**] *Ann. Sper. agr.* 1959, **13**, No. 1, 5–23, bibl. 16, English summary. [Sta. Sper. Granicolt. Sicilia, Catania]

Twenty cultivars of durum wheat (8 established varieties and 12 under trial) were grown in 7 experimental fields in different types of soil in Sicily. The good quality of the grain of the valuable varieties was maintained in most localities, Cappelli being always first on the list ; Patrizio and Bidì 368 were equal to Cappelli in some characteristics. Some of the varieties under trial also showed good grain quality.—E.B.O.

9 Ciferri, R. and Bonvicini, M. Revisione delle vecchie razze italiane in rapporto ai frumenti mediterranei. 1. *Triticum aestivum.* [**A revision of the old Italian varieties in relation to the Mediterranean wheats. 1. *T. aestivum.***] *Suppl. Ann. Sper. agr.* 1959, **13**, No. 5, 59–154, illus., English summary. [Ist. Bot. Univ. Pavia, Italy]

Descriptions are given of 107 cultivars of *T. aestivum*, belonging to 11 botanical varieties.—E.B.O.

10 Gattani, M. L. and Abdulla. **Control of some important plant diseases in Afghanistan.** *Pl. Prot. Bull.* 1959, **7**, No. 5, 64–8, illus. [FAO]

In the simple method described for treating wheat seed for the control of bunt (*Tilletia foetida*) and leaf spot (*Septoria tritici*), approximately 7 kg of seed, placed in an earthenware pot, are mixed with 14 g of ceresan.—E.B.O.

11 Forsyth, F. R. and Peturson, B. **Control of leaf rust of wheat with inorganic nickel.** *Pl. Dis. Rptr* 1959, **43**, No. 1, 5-8, bibl. 5. [Dep. Agric. Res. Lab., Winnipeg, Manitoba, Canada]

Ni salts were applied for the control of rust on plots of Thatcher wheat at Winnipeg in 1957–8. Nickel chloride and nickel nitrate hexahydrates applied at 0·6–1 lb. in 66 gal. of water per ac., controlled wheat leaf rust (*Puccinia rubigo-vera*) and increased yields by 8–21%.—E.B.O.

12 Masaki, J. **Studies on rice crane fly, (*Tipula aino* Alexander, Tipulidae, Diptera) with special reference to the ecology and its protection.** [Japanese] *J. Kanto-Tosan Agric. Exp. Sta.* 1959, No. 13, 1–202, bibl. 176, illus., English summary pp. 178–89.

This monograph closes with suggestions for controlling the larvae of rice crane-fly in wheat- and barley-fields. The first is to dust the cereal seeds with 5% DDT, 2% endrin, 4% aldrin or 4% dieldrin, using 0·02% of the seed weight. Alternatively the insecticide can be dusted [into the drill row] using 2–3 kg per are. F. Eng. s.—D.B.

13† Gaffney, D. **Some aspects of growing season definitions and their applications in Australia.** *Aust. Met. Mag.* 1958, No. 23, 37–43, bibl. 21.

The term "growing season," as applied to wheat by workers in Australia, is defined and the theoretical considerations underlying this definition are reviewed. Modifications of the term for use in other localities and for other plants are discussed and the possibility of a more consistent use of the term is considered. F. s.—S.M.J.

14 Pinto, F. F. and Thorpe, H. C. **Identification of red wheat varieties in Kenya.** *Rep. Pl. Breed. Sta., Njoro.* Nairobi, 1959, bibl. 2, illus. [Received July, 1959]

A system is described for the identification of the grain of Class I and III wheat varieties. It is based on the positive identification of 24 varieties, using morphological criteria and a phenol staining test. F. s.—S.M.J.

15 Seidman, G. **A study of the distribution of sulfur among various components of the wheat kernel using sulfur-35 as a tracer.** *Diss. Abstr.* 1959, **19**, No. 12, 3100–1. [Kansas State Coll., Manhattan]

16 Fitzgerald, P. H. **Germination induced by excision of the endosperm of immature wheat grains.** *N.Z. J. agric. Res.* 1959, **2**, No. 4, 735–40, bibl. 4. [DSIR, Christchurch, N.Z.]

Seeds which have recently become plump, and in which the embryo is well defined, can be excised as described to give approximately 70% germination within 15 days, whereas less than 40% would germinate within 31 days if they were not so treated. Complete germination cannot be expected from heads showing these early stages of maturity and, if this is desired of a particular spike, it would be better to wait until the seeds have changed from green to yellow and have a dough-like endosperm ; excision could then be expected to give almost 100% germination within 15–20 days ; only about 50% of such seeds would germinate within 31 days if they were not excised. The method described has the advantage not only of overcoming the delays and wide range of germination time consequent upon the dormancy of newly harvested seed, but also saves the 2 weeks normally required for the seed to ripen. F. s.—M.H.

17 Povar, F. V. [**The effect of presowing warming and vernalization of seed on the yield of spring wheat.**] [Russian] *Agrobiologija* (*Agrobiology, Moscow*) 1959, No. 1, 141. [Lvov State Pedagogic Inst.]

To study the effectivity of certain measures of presowing treatment of seed for sowings in the Lvov Province of the Ukrainian SSR [50° N.lat., 24° E.long], a test was made (3 replications) as follows : (1) control, untreated grain sown ; (2) heating the grain in warm air at 18–20°C. for 8 to 12 days before sowing ; (3) vernalizing the grain [temperature not given] soaked in unheated water; (4) vernalizing grain soaked in water heated to 45°C. The data show that (2) increases germination energy by 17 to 22%, accelerates seedling emergence by 1 or 2 days and increases crop yield (ranging over 4 years) from 3 to 400 kg/ha, i.e. from 2 to 29%. The increase in yields resulting from (4) compared with (3) was from 3 to 14%.—M.H.

18 KYDREV, T. G. **[The effect of presowing treatment of wheat caryopses, to improve drought resistance, on forced dormancy and germination.]** [Russian] *Fiziol. Rast. (Pl. Physiol. USSR)* 1959, **6**, No. 2, 171–5, bibl. 8, English summary.

The capacity of wheat caryopses to become dormant, after soaking and partial germination, is retained until the coleoptile unfolds and is dependdent on the presence of fat reserves. Plants grown from caryopses which are dried after soaking are most resistant to cold. F. Eng. s.—M.H.

19 NANDA, K. K. and others. **A method for the determination of the rate of seedling growth and its application to the study of the effect of presowing hardening treatment on wheat grain.** *Phyton* 1959, **12**, No. 2, 153–61, bibl. 12. [Dep. Bot. Univ. Delhi]

Seeds of 12 varieties of wheat (*Triticum vulgare*) were germinated on a thin layer of sand in Petri dishes, and the dry weights of seedlings, excised from the seed (25 for each variety), were determined at well-marked germination stages. The close relationship which was found to exist between germination stage and dry-matter production provided a rapid method for determining seedling growth rate. The effect of pre-sowing hardening treatment, consisting in repeatedly soaking and drying the seeds, on germination and seedling growth rate was determined by this method. Results showed that the pre-sowing hardening treatment resulted in accelerated rates of germination and seedling growth under all conditions of germination tested (1 and 5 ml water, and solutions of 1 and 5 ml NaCl, per dish).—E.B.O.

20 SARIC, M. **The importance of the stages of plant growth and development for the applications of cultivation in plant production and in relation to other factors influencing yields.** *Rep. World Congr. agric. Res. Rome*, 7–9 May, 1959, pp. 9, illus., French, German, Spanish and Italian summaries. [Inst. Agric. Res., Novi Sad, Yugoslavia]

This paper reports the results from : (a) a study of the cold resistance of various wheat varieties in relation to the phase of growth and development ; and (b) a study of the effect of top-dressing with N at different stages of growth and development of wheat.—E.B.O.

21 HENKEL' P. A. and ŽIVUHINA, G. M. **The process of protoplasm isolation as the second phase of winter-wheat hardening.** [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1959, **127**, No. 1, 220–3, bibl. 23. [Timirjazev Inst. Pl. Physiol. Moscow]

From a study of winter wheat during the autumn/winter period, the following conclusions are drawn. Isolation of the protoplasm from the cell walls begins after completion of the first stage of cooling and follows the accumulation of soluble carbohydrates in the cells. The isolation then continues at temperatures below freezing point (−5° to −8°C.). In other words, protoplasm isolation occurs in cells of winter wheat at the second stage of cooling, which stage is associated with physico/chemical changes in the protoplasm. This isolation occurs during the ultimate development (in autumn) of frost resistance in winter cereals.—M.H.

22 ŠČERBAKOV, B. I. **[Change in the rhythm of development and of growth in spring wheat as a result of many years' cultivation in the desert.]** [Russian] *Fiziol. Rast (Pl. Physiol., USSR)* 1959, **6**, No. 3, 318–23, bibl. 16, English summary. [Bot. Inst., Acad. Sci. Kazah SSR, Alma-Ata]

The study is concerned with change in the rhythm of development and growth of this crop after long cultivation in the Betpak Dala steppe [46°N., 72°E.]. The experiments were conducted under field conditions of the Cis-Balhaš desert with the soft spring wheat Erythrospermum 841 grown in the Saratov, Džezkazgan [48°N., 68°E.], Alma-Atinsk and Karagandin areas, and also the variety Graecum 1538 grown in Džezkazgan (in order to check the extent to which any differences, shown in growth and development, are varietal differences). The data show that the rate of development is increased while growth rate and total leaf area are decreased by very dry conditions ; these reactions are those characteristic of the drought-resistant Erythrospermum 841.—M.H.

23 ASANA, R. D. and MANI, V. S. **Analysis of drought resistance in crop plants. 2. The influence of soil-drought on the relation between yield and ear characters in wheat (field experiments).** *Indian J. Genet.* 1958, **18**, No. 2, 187–98, bibl. 1. [Indian Agric. Res. Inst. New Delhi]

In 3 out of 4 field experiments observations confirmed the conclusions from earlier pot experiments that, under adequate soil moisture, ear

number consistently had the greatest effect on yield, whereas under restricted soil moisture, number of grains per ear (and in some cases 1000-grain weight) was as effective as number of ears. See also *Fld Crop Abstr.* 10 : 862. F. S.—D.B.

24 KONOVALOV, Ju. B. [**The effect of a deficiency in soil moisture on grain filling of spring wheat.**] [Russian] *Fiziol. Rast.* (*Pl. Physiol. USSR*) 1959, **6**, No. 2, 183–9, bibl. 20, English summary.

The object of this work was to study the effect of soil drought at the time of grain filling on the dynamics of : the weight of the vegetative mass ; grain ripening ; water content of the green organs and grain as a criterion of the basic cause of reduced yields ; and the role of photosynthesis (during grain filling) in the formation of grain dry-matter. In culture tests (4 replications) with the Moskovka and Lutescens 62 varieties of spring wheat there was evidence that a deficiency of soil moisture at the time of grain filling at first increased the rate of ripening by increasing the translocation of N substances to the grain. At the milk-ripe stage, however, photosynthesis was an important factor for the accumulation in the grain of dry matter, and the ultimate lowering of grain yields as a result of drought at this stage was attributed to lessened intensity of photosynthesis and to a greater expenditure of organic substances through respiration. N was translocated from the vegetative organs to the grain, even during darkness. The Moskovka variety is less drought resistant than Lutescens 62 : this lower resistance under drought is shown by the lower 1000–grain weight, a greater fall in vegetative weight, a higher depletion of moisture in the grain and green organs, and a higher percentage of N in the grain. It is maintained, however, that before these features are accepted as characteristic of the degree of drought resistance in crops, tests with many more varieties should be made.—M.H.

25 TOMBESI, L. Indagini sul consumo idrico del frumento compiute nel periodo 1954–57. Influenze della natura del suolo e del ringrano. [**Investigations on the water consumption of wheat during 1954–7. Influence of the nature of the soil and of continuous cropping with wheat.**] *Ann. Sper. agr.* 1958, **12**, No. 6, 1677–87, bibl. 10, English summary. [Sta. Chim.-agr. Sper., Roma]

In trials over 3 years, wheat was grown in lysimeters containing (i) a clay-calcareous soil or (ii) a pozzolana (volcanic incohesive soil). Results showed that : (a) in the 1st year (1954–5), under similar conditions of moisture supply, significantly higher yields of grain and straw were obtained from (i) than from (ii) ; the unit water consumption of the whole plant and of the grain were generally lower in (i) than in (ii) ; (b) in the 2nd and 3rd years, yields gradually decreased on both soils although they were still higher in (i) than in (ii) ; (c) when wheat was repeatedly grown on the same soil, the unit water consumption of the whole plant tended to increase although in an irregular manner, and the unit water consumption of the grain increased gradually from 1100–1600 [l. water consumed per kg. of dry matter produced] in 1955 to 2100–8000 in the succeeding years.—E.B.O.

26 HANSEL, H. Untersuchungen über den Einfluss von Zahl der Kronenwurzeln, Halmdurchmesser und Halmlange auf die Standfestigkeit von Winterweizen (*Triticum aestivum*). [**The influence of number of crown roots and of diameter and length of stalk on resistance to lodging in winter wheat** (*T. aestivum*), *Ber. ArbTag. ArbGemeinsch. Saatzuchtleiter, Gumpenstein* 1957, 69–95, bibl. 8, illus.

In 21 varieties of winter wheat the correlations were determined between lodging and each of the following characteristics : number of crown roots per ear-bearing stalk, basal diameter of stems, length of stem, number of ears, and breaking strength of the lower part of the stem. These characteristics exhibited varietal differences. From these experiments, the characters of greatest importance for preventing lodging were a short stem and a large basal stem diameter. When selecting material [for breeding] these characters indicated high breaking strength and a large number of roots per stalk.—D.B.

27 ASANA, R. D. and others. **Studies in physiological analysis of yield. 3. The rate of grain development in wheat in relation to photosynthetic surface and soil moisture.** *Physiol. Plant.* 1958, **11**, No. 4, 655–65, bibl. 6. [Indian Agric. Res. Inst., New Delhi]

The results are given of pot- and field-trials during 1954–6 to investigate the relationship between the rate of increase of grain weight and the rate of yellowing of leaves, stems and ears in a number of wheat varieties. In the pot trials, plants were grown either with adequate moisture supplies, or under conditions of simulated drought in which they were watered only when they reached the permanent wilting point after dehiscence. This stage was chosen as being approximately that at which moisture stress becomes acute in non-irrigated conditions in the field in India. In the field trials, the plants were grown with or without irrigation. Under drought conditions, during the first 4 weeks after dehiscence the yellowing of the leaves and stems was hastened, the rate of increase of grain weight was unaffected, the grain number was reduced and the 1000-grain weight increased. Under conditions of adequate moisture supply, grain weight increase was more rapid than under

drought conditions, as a result of an increase in 1000-grain weight. Photosynthesis in the ear appeared to exercise a dominant role in the rate of increase of grain weight during the post-dehiscence stage and variations in the area of green leaf and stem were relatively unimportant. The varieties differed in their rate of ear yellowing and, as this characteristic was correlated with grain yields, it was considered that this factor should be taken into account when selecting wheat varieties for non-irrigated conditions in India.—P.J.B.

28 ASANA, R. D. and SAINI, A. D. **Studies in physiological analysis of yield. 4. The influence of soil drought on grain development, photosynthetic surface and water content of wheat.** *Physiol. Plant.* 1958, **11**, No. 4, 666–74, bibl. 11. [Indian Agric. Res. Inst., New Delhi]

In a continuation of the studies reported in the previous abstract, wheat, vars N.P.720 and PbC281, was grown in plots under conditions of adequate moisture, or simulated drought in which they were watered only when they had reached the permanent wilting point after dehiscence. Intermittent simulated drought during the post-dehiscence period inhibited stem growth, hastened the yellowing of leaves and stems and reduced grain numbers, but increased grain size, with the result that the rate of grain weight increase under both moisture regimes was similar for 4 weeks after dehiscence, during which period the ears remained green. The lack of effect of drought on grain development during this period was not attributable to increased photosynthetic activity induced by drought, or to an increase in the supply of catabolic products from the leaves. The bearing of these results on the breeding of varieties adapted to drought conditions is discussed.—P.J.B.

29 RIDDELL, J. A. and GRIES, G. A. **Development of spring wheat : 2. The effect of temperature on responses to photoperiod.** *Agron. J.* 1958, **50**, No. 12, 739–42, bibl. 14. [Purdue Univ., Lafayette, Indiana]

Spring wheat, var. Chinese and White Federation 38, was grown at 60, 70 or 80°F., under 8, 12, 16 and 20 hr. photoperiods. The time of flowering became progressively earlier as the photoperiod lengthened. At 60°F., Chinese was relatively insensitive to photoperiod ; under 8 hr. days it flowered earlier than did White Federation 38, but the time taken for floral initiation was the same in both varieties. Except under these conditions, Chinese always differentiated a greater number of nodes, and flowered later, than did White Federation 38. The latter developed progressively more rapidly than Chinese at 60°F. under long photoperiods. High temperatures reduced the number of nodes developed per day in both varieties. In Chinese, photoperiod had little effect on the number of nodes produced per day, whereas in White Federation 38 this reached a minimum under 12 hr. photoperiods.—R.B.

30 ALTUHOVA, L. A. [**Effect of change in the photoperiod at different developmental phases on the amylolytic activity in wheat leaves.**] [Russian] *Zap. Leningr. sel'sk. Inst. (Papers Leningrad Agric. Inst.)* 1958, No. 13, 94–6, bibl. 10.

31 ALEKSANDROV, V. G. and DOBROTVORSKAJA, A. V. [**Physiological anatomy of the epidermis of the leaf-like organs of the wheat spikelet. The glume.**] [Russian] *Bot. Ž. SSSR (Bot. J., USSR)* 1959, **44**, No. 6, 759–71, bibl. 16, illus. English summary. [Komarov Bot. Inst., Leningrad]

32 FEDOROV, A. K. [**Different responses to light conditions as one of the distinctions between spring-sown, interchangeable, and winter-sown plants. The response of plants to light conditions as one of the factors which determine the duration of the vegetative period.**] [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci., USSR)* 1959, **128**, No. 2, 411–13, bibl. 3.

Autumn light is of significance in determining the capacity to overwinter in spring forms of wheat which have been changed to winter forms. By the reaction to light of plants which differ in their phasic development, the magnitude of this capacity to overwinter is profoundly affected (see *Fld Crop Abstr.* 8 : 310, 385). When spring wheat is changed to winter wheat, the progeny of the winter form includes not only winter plants, but also interchangeable types (i.e. those which, when sown in spring, ear satisfactorily and, when sown in autumn, survive the winter well). These interchangeable plants have their development and growth retarded under short day and weak light intensity, and this retardation ensures their winter-hardiness. Development from their vernalized seed is hardly accelerated at all under long day, but it is greatly accelerated under short day. The author has studied the time required from seed-sowing to earing in the F_1 hybrids obtained from various crosses between these three different types of wheat. When sown on 26 April, the F_1 plants from spring × interchangeable types and from spring × winter types show that differentiation of ear initials and full earing take place in the same time as the parent spring type. When sown in autumn (11 and 21 Aug.) development and growth in the F_1 plants are greatly retarded compared with the parent spring type. In general, this acute retardation under the influence of autumn sowing is a characteristic feature of interchangeable plants. The F_1 hybrids from interchangeable × winter types sown in spring are also greatly retarded in development,

and they remain at the tillering stage for more than half the summer, resembling winter plants in appearance. However, by Aug. or Sept. they ear satisfactorily. Earing is earlier in the F_1 plants when Koopertorka is the winter type used, and later when the winter type Lutescens 329 is used. Thus, in autumn sowings of F_1 from interchangeable × winter types, there is, outwardly, little difference from normal winter plants. When vernalized seed is sown, earing is approx. 50 days earlier than the unvernalized control. The F_1 plants from Koopertorka × interchangeable 26191 (vernalized seed) eared 33 days earlier than the control. By sowing non-vernalized seed from this same cross and maintaining the plants in continuous light, earing was advanced by 30 days. A great influence is effected by light intensity ; for example, F_1 plants (from winter Lutescens 329 × interchangeable 26191) grown in continuous light of 70,000 lux intensity, eared 41 days after germination, but under 4500 lux, in 75 days. It is concluded that the F_1 plants from the crossing of different types are distinct in their reaction to light conditions at the early stage of growth (if seed is not vernalized). From this it is postulated that the original parent types belonging to different developmental reactions (spring, winter or interchangeable) are also distinct in their reaction to light in their early stages (up to the prolonged effect of low temperature in sowings of non-vernalized seed). Since spring and interchangeable plants are distinct in their reaction to light (especially in retardation of development in short day and weak light) and the F_1 plants from these two types, when crossed with each other or with winter forms, also differ in their reactions to light, it is deduced that winter forms differ from interchangeable forms in their reaction to light. The observations on F_1 from interchangeable × winter types led to the conclusion that winter forms should ear under uninterrupted light of adequate intensity, without preliminary vernalization. Experiments which confirm this are described. It is claimed that it is possible by control of light conditions to obtain plants with a definite vegetative period, and good winter resistance.—M.H.

33 Novikov, V. A. and Vitkovskaja, V. V. [**Change in the respiration intensity during ontogeny in spring wheat.**] [Russian] *Zap. Leningr. sel'sk Inst. (Papers Leningrad Agric. Inst.)* 1958, No. 13, 80–5, bibl. 17. [Received July, 1959]

34 Austin, A. **The assimilation of inorganic nitrogen by nitrogen-starved wheat seedlings.** *Phyton* 1959, **12**, No. 1, 43–57, bibl. 20. [Indian Agric. Res. Inst., New Delhi]

35 Shen, K. M. and others. **Distribution and accumulation of assimilates in wheat during ripening.** *Sci. Rec.* 1959, **3**, No. 9, 437–40, bibl. 8. [Inst. Pl. Physiol., Academia Sinica]

When at the milk stage, selected portions of wheat plants (var. Chungnung 28) were enclosed separately in glass tubes and supplied with circulating radioactive $^{14}CO_2$ for 15–20 min. under natural light. After 2 days, plants were examined for translocation of ^{14}C. Results show that, during the seed-ripening period and under field conditions, the first (flag) leaf is the most important organ of photosynthesis and that 60–75% of its products of assimilation pass into the grain within 2 days. Because of its high rate of photosynthesis and translocation, the first leaf makes the most important contribution towards grain yield.—D.B.

36 Drozdov, S. N. [**The need of spring wheat for microelements during ontogeny.**] [Russian] *Zap. Leningr. sel'sk. Inst. (Papers of Leningrad Agric. Inst.)* 1958, No. 13, 61–8, bibl. 23. [Received July, 1959]

37 Albareda, J. M. and others. Interacción Ca/K en la absorción de estos elementos por la planta de trigo. 3. Influencia de la relación Ca/K en la asimilación de los distintos elementos por la planta de trigo. [**Ca/K interaction in the absorption of these elements by the wheat plant. 3. Influence of the Ca/K ratio on the assimilation of different elements by the wheat plant.**] *An. Edafol. Fisiol. veg.* 1958, **17**, No. 12, 893–934, bibl. 23, English summary. [See also *Fld Crop Abstr.* 12 : 1123].

38 Hernando, V. and Sánchez, C. M. P. Influencia del sodio en el desarrollo de la planta de trigo en soluciones con bajo contenido en calcio y potasio. [**Influence of Na on the development of the wheat plant in solutions with low contents of Ca and K.**] *An. Edafol. Fisiol veg.* 1958, **17**, No. 12, 973–1004, bibl. 8., illus., English summary.

39 Miladinovic, N. **The effect of the duration of natural lodging of crops on the quality of flour and the content of some elements in wheat grain.** *Rep. World Congr. agric. Res. Rome*, 7–9 May, 1959, pp. 5, French, German, Spanish and Italian summaries. [Inst. Agric. Res., Zaječar, Yugoslavia]

In a plot trial with the wheat variety Romanian Red, rain and wind caused some of the plants to lodge on 27 May, 1956. Three variants were present : (a) plants which did not lodge ; (b) plants which lodged 2 days after flowering and remained thus until ripe ; (c) plants which lodged 2 days after flowering but became erect again about 9 days later. The percentage of hard grains was 57 in (a) and 79 in (b). The percentage of crude protein in the flour from the grain of (b) and (c)

was higher than in the flour from the grain of (a). However, the total yield of crude protein per ha. from (b) was only 85·6% of that from (a).—E.B.O.

40 CATALANO, M. and TESTINI, C. Ricerche sulla qualità della granella e della farina di frumento in funzione della fertilizzazione azotata. [**Investigations on the quality of the grain and flour of wheat in relation to N manuring.**] *Ann. Fac. Agr., Bari* 1958, **12**, 95–113, bibl. 66, English summary.

In the plot trial described, in which the wheat variety Funo was dressed with 0, 30, 60, 90 or 120 kg N/ha, the N content of the grain was 1·709, 1·755, 1·803, 1·896 and 1·999%, respectively—E.B.O.

41 SETH, J. **Factors affecting varietal differences in protein content of wheat.** *Diss. Abstr.* 1959, **19**, No. 11, 2710–11. [N. Carolina State Coll., Raleigh]

Two wheat varieties with high, and two with low, contents of protein in the grain were grown in the field and in the glasshouse to study factors affecting the protein content of the grain. There were no differences between varieties in their capacity to absorb N during early growth stages. Varieties which produced grain with high protein content had a higher protein content in the grain and lower protein content in the roots during the period of kernel formation than those with low protein contents in the grain. There were no varietal differences in root growth, or response to different forms of applied N.—P.J.B.

42 CAVAZZA, L. and MONTEMURRO, O. Influenza della concimazione azotata sulla composizione chimica di granella e paglia di frumento. [**Influence of N manuring on the chemical composition of the grain and straw of wheat.**] *Ann. Fac. Agr., Bari* 1958, **12**, 319–46, bibl. 40, English summary.

In the plot trial described, wheat received 250, 500, 750 and 1000 kg. ammonium nitrate per ha per annum, during 3 consecutive years. In both grain and straw, the protein content increased, and the N-free extract decreased, with increasing N applications ; with 1000 kg ammonium nitrate, crude protein content was, on a dry-matter basis, 18·7% in the grain and 5·28% in the straw, compared with 14·9% and 2·79%, respectively, in the control which received no N.—E.B.O.

43 TONIOLO, L. Concimazione azotata tardiva al frumento. Effetti sulla coltura e sulla qualità della farina. [**Late N manuring of wheat. Effects on the crop and on flour quality.**] *Agricoltura d. Venezie* 1959, **13**, No. 9, 405–21, bibl. 36. [Ist. Agron., Univ. Padova, Italy]

In a plot trial in 1954–6, the autumn-sown wheat variety Mara was manured with superphosphate and sulphate of ammonia at sowing, and with the following amounts of N applied as top dressings: (a) a total of 46·5 kg N divided in 3 applications (Dec., Jan., Feb.) ; (b) 46·5 kg N applied as in (a) plus 31 kg N, half of which was applied at shooting and half at flowering (total 77·5 kg) ; (c) 23·25 kg N applied as in (a) plus 23·25 kg N applied half at shooting and half at flowering (total 46·5 kg). Results showed that grain yields were not significantly affected by the different N treatments. The most important result obtained concerned the yield of grain crude protein per ha. The yields of grain crude protein from (b) and (c) were practically the same, both being significantly higher than from (a). Flour quality was correspondingly better with treatments (b) and (c) than with (a).—E.B.O.

44 COÏC, Y. Apports recents de la physiologie végétale à l'agronomie. [**Recent contributions of plant physiology to agronomy.**] *Rep. World Congr. agric. Res. Rome*, 7–9 May, 1959, pp. 6, bibl. 4, English, German, Spanish and Italian summaries. [Sta. Cent. Physiol. Vég., INRA, France]

This paper is concerned mainly with the N manuring of winter wheat. [See also *Fld Crop Abstr.* 12 : 1681]—E.B.O.

45 BURG, P. F. J. VAN. De invloed van een stikstofoverbemesting op granen. 2. Het verdelen der totaal benodigde hoeveelheid stikstof over voorjaarsgift en late overbemesting. [**The effect of top-dressing grain with nitrogen. 2. Dividing the total quantity of nitrogen needed into a spring application and a late top-dressing.**] *Stikstof* [Dutch edn] 1959, **2**, No. 22, 338–41, bibl. 2, illus.

Winter wheat grown on heavy clay soil was dressed with 20, 40, 60, 80, 100 or 120 kg N/ha, of which 0, 20 or 40 kg were applied in mid-June 2 days after the appearance of the last leaf, the remainder being applied on 2 Apr. Soil analysis at the time of the second N application indicated a complete lack of available N in all plots. In the plots fertilized in spring, only, applications of up to 60 kg N/ha increased grain yields considerably. Yields reached a maximum where 80 kg N were applied ; further applications caused lodging and a reduction in yield. Split applications reduced straw yields at all levels of N, gave lower yields of grain than spring applications where a total of 60 kg N/ha or less were applied, and higher yields of grain where 80 kg or more were applied. Maximum grain yields from split applications of N exceeded those from N applied in spring, only, by approximately 8%.—R.B.

46 WIDDOWSON, F. V. **The effects of nitrogen upon three stiff-strawed winter wheat varieties.** *J. agric. Sci.* 1959, **53**, 1, 17–23, bibl. 4.

Experiments were carried out at 4 centres in Bedfordshire and Hertfordshire on 3 winter wheat varieties, Hybrid 46, Heine 7 and Minister, to measure the effects of heavy dressings of N on a range of different soil types and to assess the efficiency with which each variety utilized these dressings. In 1955, grain yields were significantly increased on plots top-dressed with nitrochalk at 0·45, 0·9 and 1·35 cwt. N/ac., and on plots combine-drilled with the seed at rates of 0·15 cwt. N/ac. with additional topdressings of 0·3 or 0·75 cwt. N/ac. Mean responses in '56 and '57 using lower rates of N were relatively smaller. Hybrid 46 was the only variety which gave consistently high yields of grain and crude protein at the heaviest rates of manuring. F. s.—s.m.j.

47 Podvalkova, I. A. **[The need of spring wheat for N, P and K at different stages of development.]** [Russian] *Zap. Leningr. sel'sk. Inst. (Papers Leningrad Agric. Inst.)* 1958, No. 13. 69–79, bibl. 20. [Received July, 1959]

The experiments reported show that spring wheat at the vernalization phase requires adequate supplies of N, P, K ; the absence of any one retards growth and reacts adversely on all subsequent phases. At the photophase, the plant has great need of N and P, and the absence of K has no effect. At the 3rd phase, the absence of N, P or K slightly lowers the accumulation of green weight but does not affect growth. At the 4th stage there is an increase in requirement for K, but the absence of N and P does not affect the plant at this stage.—m.h.

48 Parbery, D. B. **The application of a modified technique in crop logging on wheat and corn in western New York State.** *Diss Abstr.* 1959, **19**, No. 12, 3069–70. [Cornell Univ., Ithaca, New York State]

Investigations were made of the responses of a number of morphological and physiological indices in wheat and maize to different rates of application of N, P and K to the soil. In trials with wheat in 1956, only 3 out of 13 indices were significantly correlated with the amount of N applied ; these were : plant height, content of N in the stems and leaves and length of ear. The combined mineral composition of stems and leaves was the best plant tissue index of soil N, P and K status. Physiological indices were more than twice as efficient as morphological indices in accounting for variations in final yield. In trials with maize in 1956, 5 out of 33 indices were significantly correlated with N applications ; these were : plant height, leaf number, tiller number, ear number and fresh weight. The basal stem composition was the best plant tissue index of the N, P and K status of the soil. Physiological and morphological indices together were more than twice as effective for accounting for yield differences as morphological indices alone. In trials with maize in 1957, at only 1 location out of 5 was manuring, based on fresh weights and plant tissue tests as indices of the most appropriate fertilizer treatments during the growing season, effective in producing higher yields than where the highest rate of fertilizer was applied at sowing. At 4 locations, the use of plant tissue tests and fresh weight indices for adjusting fertilizer treatments resulted in yields second only to those where the highest rate of fertilizer was applied at sowing.—p.j.b.

49 Ricci, C. Problemi della ventilazione del grano nei sili. **[Problems of aeration of wheat grain in silos.]** *Ann. Fac. Agr., Bari* 1958, **12**, 130–57, bibl. in text, illus., English summary.

BUCKWHEAT

See also Abs. 397, 420.

50 Žebrak, E. A. **Photoperiodic reaction of tetraploid and diploid buckwheat.** [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1959, **128**, No. 1, 176–8, bibl. 5.

The western ecotype of *Fagopyrum esculentum* is a long-day plant. Shortening the light period to a 9-hr day retards the onset of flowering in diploid buckwheat more than in the tetraploid crop. The tetraploids are potentially more productive than diploids under adequate supplies of moisture and nutrients.—m.h.

OATS

See also Abs. 394, 450.

51 Kinsey, C. **Oats.** *Publ. Minist. Agric. Fish., Fd, England and Wales*, 1959, pp. 42, 2s. 6d. [Received August, 1959]

Practical recommendations are given on varieties, sowing, cultivation, fertilizing, grazing, weed control, pests and diseases, harvesting and utilization of oats in Gt Britain.—s.m.j.

52 Frey, K. J. **Yield components in oats. 1. Effect of seeding date.** *Agron. J.* 1959, **51**, No. 7, 381–3. [Iowa Agric. Exp. Sta., Ames]

In experiments with 3 oat varieties sown for 4 yr on 3 dates in April or early May, the percentage reduction in yield caused by late sowing was smaller in Andrew and Sauk than in Bonham. Andrew produced more grains per head from late than from early sowing. The number of heads per plant was relatively constant in Sauk, but Andrew and Bonham produced fewer heads from late sowing. Late sowing reduced the relative 1000-grain weight to a similar extent in all varieties.—r.b.

53 Edinburgh and East of Scotland College of Agriculture and Research Association of British Flour Millers. **The**

quality of oats for milling into products for human consumption and for livestock feeding. 1959, pp. 7.

A list is given of oat varieties commonly grown in East Scotland, divided into those which are recommended, or are not recommended, for milling. The characteristics of their grain (percentage kernel content, kernel weight, and occurrence of empty and double grains) and the level of oil- and protein-contents of the grain are also shown.—A.D.H.

54 Seed World. **Minnesota releases Minton oats.** *Seed World* 1959, **84,** No. 12, 26–7.

Minton outyielded all other oat varieties tested in 3 years of field trials. It heads about 4 days later than Minhafer and 2 days earlier than Ajax, but matures slightly later than Ajax. Its straw is similar in length to Minhafer but is less strong. It is resistant to attack by *Ustilago* spp. and most physiological races of *Puccinia graminis* and *P. coronata.*—R.B.

55 Klinck, H. R. and Gauthier, F.-M. Glen — une nouvelle variété d'avoine hâtive pour le Québec. [**Glen, a new early-maturing oat for Quebec.**] *Agriculture, Montréal* 1959, **16,** No. 2, 41–3. [Macdonald Coll., Quebec]

Glen, a cross between Ajax and Roxton, is resistant to *Puccinia graminis avenae,* moderately resistant to *P. coronata* and *Ustilago avenae,* and susceptible to *U. kolleri.* It produces high grain yields, the grain is large and white and the straw is moderately stiff and slightly longer than that of Abegweit.—R.B.

56 Ghisleni, P. L. Risultati di prove triennali di confronto fra forme di avena (*Avena sativa* L.) italiane e straniere. [**Results from 3 years' trials to compare Italian and foreign oat (*A. sativa*) varieties.**] *Ann. Accad. Agric. Torino* 1958-9, **101,** pp. 8, bibl. 8. [Ist. Agron., Univ. Torino, Italy]

From the results of trials in 1955 and 1957–8 it is concluded that, of the oat varieties tested, Ava is the best for the Turin area. In 1957 Ava gave a considerably higher grain yield (4749 kg/ha) than the other varieties ; in 1955 and 1958 its grain yields were good, although they were not the highest.—E.B.O.

57 Barannikova, Z. D. [**Temperature and the quality of light as factors in the passing of the third developmental phase in the oat plant.**] [Russian] *Zap. Leningr. sel'sk. Inst.* (*Papers of Leningrad Agric. Inst.*) 1958, No. 13, 5–12, bibl. 17. [Received July, 1959]

Varieties of *Avena sativa* and *A. byzantina* from various sources comprised the experimental material. The third developmental phase, according to F. M. Kuperman, takes place from the time of differentiation in the stem apex to the formation of the first pollen tetrad. In order to pass this phase, the oat plant requires a higher temperature (18·5°C.) than that for passing the photophase (12·7°C.). The wave-length of light does not affect the rate of passing the third phase.—M.H.

58 Strong, R. G. and Lindgren, D. L. **Effect of methyl bromide and hydrocyanic acid fumigation on the germination of oats.** *J. econ. Ent.* 1959, **52,** No. 3, 415–8, bibl. 7. [Univ. California Citrus Exp. Sta., Riverside]

Grain of Kanota and Ventura oats containing 8, 10, 12 and 14% moisture, was fumigated at 50, 70 and 90°F, with HCN or CH_3Br. Fumigation with HCN for 72 hr. had no effect on germination. Impairment of germination resulting from treatment with CH_3Br. was increased as time of exposure, rate of application, temperature during fumigation, and seed moisture-content increased. Oats were slightly more susceptible to fumigation damage than barley. [See. *Abs.* 74]—R.B.

RYE

See also Abs. 386, 415.

59 Bremer-Reinders, D. E. **The early stages of development in the rye spike.** *Acta bot. néerl.* 1958, **7,** 223–32, bibl. 16, illus. [Inst. Agric. Pl. Breed., Wageningen]

A description is given of the normal course of development of the rye plant.—G.M.R.

60 Dobben, W. H. van. De veldproeven met late stikstofbemestingen op winterrogge in 1957. [**Field trials with late nitrogen applications on winter rye in 1957.**] *Stikstof* [Dutch edn] 1958, No. 18, 175–81, illus.

In field trials with winter rye top-dressed with N at the onset of flowering, 20 and 40 kg N/ha raised grain yields by 250 and 350–400 kg/ha, respectively ; the higher N rate was recommended. In one trial on sandy soil of poor moisture-retaining capacity, where 20, 40 or 60 kg N/ha was applied in spring and 20 kg N/ha at the onset of flowering, higher yields were obtained than where the total 40, 60 or 80 kg was applied in spring, only. In a neighbouring trial on moisture-retaining sandy soil, early applications of N were the more effective. Increases in yield resulting from late top-dressing were associated with an increase in the number of grains per ear.—R.B.

BARLEY

See also Abs. 392, 393, 454, 525.

61 Rayns, F. **Barley.** *Publ. Minist. Agric., Fish., Fd, England and Wales* 1959, pp. 52, illus., 3s. 6d. [Received August, 1959]

Practical recommendations are given on the cultivation and sowing, fertilizing, pests and diseases, and harvesting of barley grown in Gt Britain for malting, stock-feed or seed.—S.M.J.

62 Čenokal, V. G. and Šer, B. L. [**Winter barley in the Ukraine.**] [Russian] *Zemledelie* (*Agriculture, USSR*) 1959, **7**, No. 8, 57–62.

This crop is grown in zones of the Soviet Union where conditions in winter are favourable, namely, northern Caucasia, Transcaucasia, and the republics of Central Asia. In the Ukraine, the largest area under barley is in the Crimea. In years when overwintering is good, yields of winter-sown barley are frequently greater than those of spring barley ; e.g. in 1958, in the south of the Odessa Province winter barley yielded 3900 kg/ha of grain while spring barley gave only 780 kg/ha. The merits of the varieties Odessa 17 and Pallidum 16/60 are compared and information is given on measures for cultivation which ensure high yields. The best sowing date for the northern part of the Odessa, Nikolaev and Herson provinces is 15–25 Sept., for the southern part of these provinces, 20–30 Sept., and in the Crimea from 25 Sept. to 5 Oct. The most suitable seed rate in the southern steppe area is 140–160 kg/ha ; in the central and northern steppe regions, 150–170 kg, and in western provinces 190–210 kg/ha.—M.H.

63 Statens Forsøgsvirksomhed i Plantekultur. Forsøg med bygsorter 1953–58. [**Trials with barley varieties 1953-58.**] *Medd. 610 Stat. Forsøgsvirk. PlKult.* 1959, pp. 4.

In trials at 14 locations in Denmark, barley received either normal rates of calcium nitrate/ha, ranging from 150 to 300 kg/ha, according to circumstances, or a heavy treatment, in which an additional 200–300 kg/ha was applied. In 65 trials during 1953–8, grain yields of Svalöf Bonus, Abed Mentor and Weibulls Rika averaged 42·9, 41·6 and 40·6 hkg/ha, respectively, under normal levels of N and 44·4, 43·9 and 43·2 hkg under high levels of N. In 45 trials during 1955-8 grain yield of Hafnia, Pajbjerg Drost A and Proctor averaged 41·8, 41·4 and 40·9 hkg/ha, respectively, under normal levels of N, and 44·2, 43 and 43·1 hkg under high levels of N. Straw yields were highest for Proctor and Pajbjerg Drost A. Weibulls Rika and Abed Mentor had the stiffest straw and Svalöf Bonus the weakest. Under normal levels of N, the protein content in the dry matter of the grain ranged from 10 for Svalöf Bonus to 10·6 for Weibulls Rika and at the high level of N, from 11·9 for Hafnia to 12·4 for Abed Mentor and Weibulls Rika.—P.J.B.

64 Fischbeck, G. Ertragsleistung und Ertragsaufbau sowie Wachstums- und Qualitätseigenschaften führender europäischer Braugerstensorten unter süddeutschen Klimatverhältnissen, dargestellt an Hand der internationalen Braugerstenversuche 1952–1957 in Bayern. [**Productivity and components of the yield, also the growth and quality characteristics of the leading brewing-barley varieties of Europe when grown in the climate of south Germany, presented in connexion with the international brewing barley trials, 1952-7, in Bavaria.**] *Bayer. landw. Jahrb.* 1959, **36**, No. 2, 131–62, bibl. 20. [Inst. Acker- u. PflBau der Techn. Hochsch. München-Weihenstephan, W. Germany]

Results are summarized of the 6 years' international varietal trials held in 4 areas of S. Germany under the auspices of the European Brewery Convention. Pedigree seed of 20 important brewing barley varieties was introduced each year from Germany, Denmark, Sweden, Norway, Ireland, Great Britain, Netherlands and France. A table shows the grade reached by each variety as regards grain yield, the various components which contribute to yield, varietal characteristics during growth (duration of vegetative period, susceptibility to disease, resistance to lodging) and factors contributing towards brewing quality. In S. Germany, the best results are obtained from German varieties.—D.B.

65 Bruyère, R. Les orges de brasserie au Ruanda-Urundi. [**Malting barleys in the Ruanda-Urundi.**] *Bull. Inform. INÉAC* 1959, **8**, No. 2, 101–9, illus. [Sta. Essais de Kisozi]

An account is given of trials with malting barley in the Ruanda-Urundi to study varieties and cultural methods. The variety Abed Kenia should be replaced by Research or Carlsberg, and these should be sown as early as Feb. after a crop of potatoes or beans, using good quality seed obtained from fields sown in March.—E.B.O.

66 Day, A. D. **Harlan barley.** *Bull. 297 Arizona Agric. Exp. Sta.* 1958, pp. 7, illus.

Harlan barley is recommended for use in irrigated areas of Arizona. Yields of winter forage from this variety are similar to those from Arivat, while in most areas, yields of grain of a quality suitable for stock-feed are higher. Harlan is less susceptible to lodging than Arivat.—R.B.

67 Marshall, Gillian M. **The incidence of certain seed-borne diseases in commercial seed samples. 1. Loose smut of barley, *Ustilago nuda* (Jens.) Rostr.** *Ann. appl. Biol.* 1959, **47**, No. 2, 232–9, bibl. 10. [Official Seed Test. Sta., Cambridge]

The technique for detecting the presence of loose smut in barley grains is based on a simplified version of the whole-embryo test (Skvortzov, *Rev. appl. Mycol.* 1938, Vol. 17, p. 382). It is claimed that embryos from 1000 grains can be examined in 24 hr.—M.H.

68 Grillot, G. Note sur la classification botanique des orges cultivées. Création de nouvelles variétés. [**Note on the botanical classification of cultivated barleys. Creation of new varieties.**] *C.R. Soc. Sci. nat. phys. Maroc* 1957, No. 8, 156–60. [Received May, 1959]

This note is concerned with the system of classification adopted for studying the barley varieties in the collection at the Centre de Recherches Agronomiques, Rabat.—E.B.O.

69 Pollock, J. R. A. **Studies in barley and malt. 15. Growth substances and other compounds in relation to dormancy in barley.** *J. Inst. Brew.* 1959, **65**, No. 4, 334–7, bibl. 13. [Brewing Indust. Res. Found., Nutfield, Surrey]

GA, kinetin (6-furfurylaminopurine) and 4 analogues of kinetin each stimulated the germination of dormant barley grain and showed a synergistic effect with hydrogen sulphide. Low concentrations of kinetin or GA increased the rate of germination of non-dormant, dehusked grain ; GA was much more effective than kinetin in stimulating the germination of dormant, dehusked grain. It was concluded that GA and kinetin both act directly on the embryo, though at different stages of growth, and that the activities of these substances and of H_2S relate to 3 different factors concerned in the dormancy of barley grain. F. a. s. — P.J.B.

70 Thorne, Gillian N. **Photosynthesis of lamina and sheath of barley leaves.** *Ann. Bot., Lond.* 1959, **23**, No. 91, 365–70, bibl. 12. [Rothamsted Exp. Sta., Harpenden, Herts]

Measurements of photosynthesis were made on laminae and sheaths of the main shoots of barley plants (var. Plumage-Archer) near the time of ear emergence. The net assimilation rate of cereals based only on lamina area is much less than that of dicotyledonous crops growing under the same conditions (*Fld Crop Abstr.* 1 : 416). This comparative inefficiency of cereal leaves is even more pronounced when both laminae and sheaths are included in the measurement of total leaf area. It is suggested that for growth-analysis studies the size of the photosynthetic system of cereals should be measured as that of one side of the leaf laminae plus the outer surface of the combined leaf sheaths. In the later stages of growth the surface area of exposed stem and peduncle should also be included.—M.H.

71 Savickaja, N. N. [**The effect of abundant soil moisture on barley plants at different periods of their development.**] [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci., USSR)* 1959, **128**, No. 4, 850–2, bibl. 12. [Leningrad State Pedagogic Inst.]

The effect of water-saturated soil (flooded and with moisture content 100% of its water-holding capacity) on barley plants was studied at (a) the vernalization phase (from seedling emergence to formation of ear initials), (b) the photophase (formation of ear initials to the appearance of stamen protuberances), (c) the 3rd stage (appearance of stamens to formation of tetrads in the anthers), and (4) the critical phase (tetrad formation to earing), the plants being grown in culture vessels during 1956–8. The controls were grown in soil with 70% moisture during the whole of the vegetative period. It was shown that with 100% soil moisture at all developmental stages and by flooding at stage (4) there was no difference in development of the plants, which eared at the same time as the controls. Earing was retarded by 5 days with flooding at stage (b), and by 10 days at (c), compared with time of earing in the control. Observations on grain number per ear and grain weight per 10 plants showed that flooding at the early developmental phases lowers yields sharply, but with flooding at stage 4, yields are not affected. With 100% soil moisture at all phases, yields remain at a high level. There is also evidence that flooding during the first stages of plant development increases bound-water and lowers free-water content of the plants. For example, under (b) the bound water (in % crude wt of the plant) of the control was 14, but with flooding this was raised to 38 ; free water being 70 and 42, respectively. At stage (4) the corresponding figures for bound water were 14 (control) and 16 ; and for free water 63·3 and 62·8. It is concluded that when soils are flooded during the early phases of plant development there is an acute change in the course of the physiological processes in the plants (a lowering of the absorptive functioning of the root system in regard to water and nutrients, and an increase in the activity of oxidation processes), which suppresses the plants' growth and development and thereby lowers yields. Flooding during the plant's critical period, however, does not produce such detrimental effects on yields, and 100% moisture (of the soil's water-holding capacity) only slightly lowers grain yield as a result of stimulating certain growth processes.—M.H.

72 Takahashi, H. and others. **Studies on cold injury in different growing stages of naked barley.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1959, **27**, No. 3, 393–6, illus., English summary. [Tokai-Kinki Nat. Agric. Exp. Sta.]

Morphological and histological investigations were conducted on barley var. Hashirihadaka to ascertain the damage caused by extreme cold at different growth stages, viz. floral differentiation, booting to heading, heading to flowering. The injuries are described. F. Eng. s.—D.B.

73 Kinebuchi, M. and others. **Studies on sterility in lower spikelets of barley. 5.**

On the change in physiological function of barley by means of top-dressing of nitrogen fertilizer on the stage of flag-leaf emergence. [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 269–72, bibl. 1, English summary. [Hokuriku Agric. Exp. Sta.]

A top dressing of N increases the sugar-concentration gradient between the lower part of the ear of barley and the flag leaf; this improves the translocation of carbohydrates from flag leaf to ear and results in increased physiological activity in the lower spikelets. F. Eng. s.—D.B.

74 Strong, R. G. and Lindgren, D. L. **Effect of methyl bromide and hydrocyanic acid fumigation on the germination of barley.** *J. econ. Ent.* 1959, **52**, No. 2, 319–22, bibl. 7. [Univ. California Citrus Exp. Sta., Riverside]

Barley, var. Atlas 46, California Mariout, Hannchen and White Smyrna containing 8, 10, 12 and 14% moisture was fumigated at 50, 70 and 90°F. with HCN or CH_3Br. Fumigation with HCN for 72 hr. had no effect on percentage germination. There was very little difference between varieties in percentage reduction in germination following CH_3Br treatment. Seed damage caused by CH_3Br increased as the period of exposure, rate of application, temperature of fumigation, and seed moisture content increased; barley was much less susceptible to damage by CH_3Br than was wheat. [See *Fld Crop Abstr.* 12 : 1132].—R.B.

MAIZE

See also Abs. 48, 383, 392, 397, 399, 430, 431, 450, 453, 456, 457, 473, 488, 490, 528.

75 Schmidt, F. La culture du maïs grain en Haute Alsace. [**The growing of grain maize in Upper Alsace.**] *Potasse* 1959, **33**, No. 264, 87–9, illus. [Dir. Serv. Agric. Haut-Rhin, France]

76† Bunting, E. S. and Willey, L. A. **The cultivation of maize for fodder and ensilage. 2. The effect of changes in plant density.** *J. agric. Sci.* 1959, **52**, No. 3, 313–9, bibl. 14. [Agric. Res. Coun. Unit. Exp. Agron., Oxford, and Nat. Inst. Agric. Bot., Cambridge]

Maize of several varieties, comprising material of early, medium-early, medium-late or late maturity, was grown for 6 yr. at 2 locations from May to Oct. in 24–27 in. rows at plant densities varying from 4 to 16 plants/sq. yd. Plant density had little effect on earliness, plant height or chemical composition. Increasing plant density increased yields of dry matter and decreased the percentage contribution of maize ears towards the total dry weight. Tall, late varieties tended to produce more dry-matter at low plant densities than did earlier varieties. A greater percentage of lodging and of infertile ears occurred at high plant densities. Early hybrids were less susceptible to lodging than later varieties. For fodder or silage, hybrids intermediate in maturity between Wisconsin 275 and Wisconsin 341A were recommended, to be grown at a density of 9–12 plants/sq. yd.—R.B.

77 Department of Agriculture, Basutoland. [**Effect of nitrogen and plant density on yield of maize.**] *Rep. Dep. Agric. Basutoland 1958* Maseru, 1958, 33–8.

Results of experiments conducted at Maseru and at Machache indicate that where soil nitrate supply is adequate and crop residues are ploughed in, maize spaced at 3 × 1 ft. (15,000 plants/ac.) would yield considerably more than where a 3 × 2 ft. spacing (7,000 plants/ac.) was used.—S.M.J.

78 Fielding, W. L. [**The effect of plant population, nitrogen, phosphate and potash on maize.**] *Rep. Sec. Fed. Minist. Agric. Rhod. and Nyasald 1958*, 1959. 86. [Gwebi Agric. Coll. Rhodesia]

Increasing the plant population of maize from 12,900/ac. to a maximum of 14,520/ac. increased yields. Nitrogen applied as 250 lb. $(NH_4)_2SO_4$/ac. increased yields by 1888 lb./ac. A further 250 lb./ac. gave an additional increase of 472 lb./ac.—S.M.J.

79† Carlson, C. W. and others. **Evapotranspiration and yield of corn as influenced by moisture level, nitrogen fertilization, and plant density.** *Proc. Soil Sci. Soc. Amer.* 1959, **23**, No. 3, 242–5, bibl. 10 [Western Soil and Water Mgmt Res. Br., USDA, Mandan, N. Dakota]

Nodak 301 maize was grown with or without irrigation and received N at 0, 60 and 120 lb./ac. Unirrigated maize also received 30 lb. N/ac., and irrigated maize 180 lb. N/ac. Water was applied to the irrigated plots when the crop had taken up nearly 50% of the moisture available in the top 2 ft. of soil when wet to field capacity. Plant densities were 14,000 and 23,000 plants/ac. in 1956, and 10,000 and 20,000 plants/ac. in 1957. Forage yields, grain yields, and number of grains produced per sq. ft. on unirrigated plots were not affected by N applications or stand density. Forage yields were significantly increased by (a) applying N to irrigated plots, (b) increasing stand density on plots receiving 60 and 120 lb. N/ac. in 1956 and all levels of N in 1957, and (c) irrigating plots receiving 60 and 120 lb. N/ac. in both years. Under irrigation, increasing the stand density increased grain yields of plots receiving 60 lb. N/ac. in 1957 and those of plots receiving 120 lb. N/ac. in both years. N at 120 lb./ac. increased grain yields under irrigation. Both N and increased stand density tended to increase the number of grains produced per sq. ft. under irrigation. The weight of individual grains was lower at the high stand density. The evapotran-

spiration rate was not appreciably affected by N or by stand density, but was considerably increased by irrigation. The efficiency of water-use was appreciably increased, especially under irrigation, by high stand densities and N applications. Except in plots with dense stands receiving 120 lb. N/ac., water-use efficiency was greatest on unirrigated plots.—R.B.

80 Caputa, J. Mais hybrides en Suisse Romande — Résultats d'essais 1948–1955. [**Maize hybrids in French Switzerland.**] *Landw. Jahrb. Schweiz* 1958, **72,** 425–44, bibl. 11, illus., English, German, and Italian summaries. [Stat. Fédérales d'Essais Agric., Lausanne]

Results of 8 years' trials in French Switzerland with varieties and hybrids of maize grown for grain and/or silage have led to the following conclusions. Maize can be cultivated for grain in the Geneva and Neuchatel basins and in the Rhone Valley. The medium-early Wisconsin 255 and 270 are recommended for altitudes up to 500 m, and the early Wisconsin 240 up to 600 m. Grain yields from hybrids are 25–50% higher than from open-pollinated varieties. Of the hybrids, Wisconsin 270 is the best for French Switzerland. The best sowing times are : for favourable (lowland) situations, 25 April to 5 May; for the more elevated situations, on the plateau, 10–15 May. The optimum plant density is 6–7 plants/m² when grown for grain and 10–15 when grown for ensilage.—D.B.

81† Landi, R. Il Mielmais, ibrido di granoturco da foraggio. [**Mielmais, a hybrid maize for fodder.**] *Ital. agric.* 1959, **96,** No. 5, 409–18, illus.

Mielmais is a commercial name given in Italy to maize hybrids which have a high sugar content in the stem. In trials in various regions of Italy in 1958, Mielmais H.S. 50 was best for fodder. [See also *Fld Crop Abstr.* 12 : 1182.]—E.B.O.

82 Malucelli, P. Osservazioni sulla coltivazione comparativa di nuovi tipi commerciali di mais ibrido. [**Observations on the comparative performances of new commercial types of hybrid maize.**] *Ann. Sper. agr.* 1959, **13,** No. 1, 119–27, English summary. [Lab. Chim.- Agr., Forlì, Italy]

In plot trials in 1956 to find new maize hybrids suitable for the dry, medium-fertility soils of the Romagna plain, 11 types of hybrid maize and 3 common cultivars were tested. The best was the hybrid Pioneer 325 which yielded an average of 6512 kg of grain per ha.—E.B.O.

83 Hughes, R. **The agronomic characteristics of lines of maize from different sources.** *J. W. Afr. Sci. Ass.* 1958, **4,** No. 2, 117–27, bibl. 3. [Univ. Coll. Ghana, Achimota]

84 Zwijsen, R. L'amélioration de la culture du maïs à Nioka. [**The improvement of maize-growing at Nioka (Belgian Congo).**] *Bull. agric. Congo belge* 1959, **50,** No. 3, 661–74, Flemish summary. [Sta. Rech. Agron. INÉAC, Nioka]

The improved maize variety Hickory King, which matures in 207 days, yields 4000 kg dry grain per ha, about 10% more than the early maize Nioka/P/HD/55 (about 3500 kg/ha after 160 days). On the basis of average yield per day of growth, Nioka/P/HD/55 generally yields more than Hickory King and because of its earliness a second crop, e.g. sweet potatoes, can be grown. The early variety Nioka is suitable for cultivation at 1000–2170 m. a.s.l., at a spacing of 60 × 40 cm.—E.B.O.

85 Brandolini, A. Il mais in Somalia ; prospettive di miglioramento. [**Maize in Italian Somaliland; prospects for improvement.**] *Maydica* 1959, **4,** No. 2, 47–54, illus.

Maize, grown under irrigation, is the principal cereal crop in Italian Somaliland ; in 1957 it was grown on 76,558 ha and the average yield was 634 kg/ha. In trials in 1958 the yellow dent hybrids Embro 101 and Texas 30 yielded more than 4500 kg/ha (2·2 plants/sq.m) and 6500 kg/ha (4 plants/sq.m), respectively.—E.B.O.

86 Obregon, G. P. Variedades de maíz blanco, Sicarigua y Sicarigua Mejorado. [**Varieties of white maize, Sicarigua and Sicarigua Improved (in Venezuela).**] *Agricultor venezol.* 1958, **22,** No. 203, 12–14, illus.

Information, including descriptions, is given on the varieties Sicarigua Improved and Sicarigua which yielded an average of 3000–3500 and 2500–3000 kg of grain ha, respectively. These maize varieties, and also the varieties Venezuela-1 and Venezuela-3, are recommended for cultivation by those farmers who cannot grow the hybrids Guaicaipuro, Tiuna and Mara, which yielded an average of 4500 kg/ha.—E.B.O.

87 Sithamparanathan, J. **Improvement of highland crops in the dry zone. 1. Cereals and millets.** *Trop. Agriculturist* 1958, **114,** No. 1, 19–28, bibl. 2. [Dep. Agric., Ceylon]

This article reviews recent progress in the search for cereal varieties suitable for the dry zone of Ceylon. Maize is the most important cereal crop, almost all the local varieties being of the flint type. In a yield trial the introduced varieties Njoka Flat White, G.H. 188 and Synthetic 521 and the local variety Negampaha 2 yielded well, while Oklahoma 301, G.H. 293, Mannaram 2 and Negampaha 8 compared favourably with the standard variety Yellow maize.—E.B.O.

88 Fletchall, O. H. and Talbert, R. E. **Benzoic acids for pre-emergence weed**

control in corn. *Proc. 15th N. Cent. Weed Contr. Conf.* [USA] 1958, 13–14. [Missouri Agric. Exp. Sta., Columbia]

Comparisons were made between herbicidal formulations of chlorinated benzoic acids containing 60% 2,3,6-TBA (high TBA) and 3% 2,3,6-TBA (low TBA) and 2,4-D, all used at rates of 2 lb./ac. as pre-emergence herbicides in maize. The high-TBA material was almost as effective as 2,4-D against grass and broad-leaved weeds at 4 weeks after treatment ; the low-TBA material was considerably less effective than either against grass weeds. At harvest, the weight of oven-dry grass weeds on the plots treated with 2,4-D, high-TBA and low-TBA materials was 5, 12 and 21 tons, respectively, compared with 20 tons for untreated controls. Both TBA materials were much more effective against broad-leaved weeds than 2,4-D. Maize grain yields varied directly with the incidence of weeds and were highest on plots receiving the high-TBA treatments.—P.J.B.

89 LOVELY, W. G. **Applying granular herbicides for control of weeds in corn.** *Proc. 15th N. Cent. Weed Contr. Conf.* [USA] 1958, 11–12. [Iowa State Coll., Ames]

In studies during 1954–8 on the value of granular formulations of herbicides, the following conclusions were among those reached : (a) granular formulations of CDAA, 2,4-D, EPTC and simazin were as effective as spray formulations ; (b) granular 2,4-D applied at rates usual for pre-emergence treatments effectively controlled weeds in maize up to 36 in. tall, with little crop damage ; (c) pre-emergence applications of the butyl, iso-octyl and low-volatility esters and amine of 2,4-D in granular form gave satisfactory weed control, though the butyl and iso-octyl esters were most effective ; (d) satisfactory weed control was obtained by pre-emergence and early post-emergence applications of 2 or 4 lb. granular 2,4-D/ac. with no cultivation except the lay-by tillage ; (e) relatively heavy granules, containing a high herbicidal content, were most effective. In studies during 1958 pre-emergence applications of 2, 4 or 8 lb. granular 2,4-D/ac. and post emergence applications of 2 or 4 lb./ac. were almost equal in effectiveness against weeds and caused no injury to the maize. Granular simazin at 5 lb./ac. gave excellent weed control with no cultivations.—P.J.B.

90 LONGCHAMP, R. and FAIVRE-DUPAIGRE, R. Essais de desherbage du maïs avec la simazine. [**Trials to control weeds in maize with simazin.**] *Ann. agron., Paris* 1958, **9**, Suppl. 2, 171–80. [Sta. Cent. Physiol. Vég., Versailles, France]

An account is given of trials carried out in various regions of France in 1957 to study the herbicidal effects of simazin, its effect on maize yields, and its residual activity. The general conclusions were that it shows possibilities as a herbicide for maize as it has a low toxicity for this crop and a marked effect against many weeds, including *Panicum* and *Setaria* spp., but the modalities for its use are still to be determined.—E.B.O.

91 VOSSEN, T. Onkruidbestrijding met simazin. [**Weed control with simazin.**] *Meded. 11 RijkslandbConsulentschap N.-Limburg, Horst* 1959, pp. 17, mimeo.

Results from a number of trials in N. Limburg indicated that simazin at 2–3 kg/ha controlled weeds in maize sufficiently well for all practical purposes. Serradella [*Ornithopus sativus*] tolerated 2 kg simazin/ha, and produced a successful green-manure crop when sown in early July. Serradella sown at the same time as maize caused some reduction in maize yields through competition. Sowing serradella in early or mid-June was considered to be more advantageous for both crops than earlier or later sowing. Simazin at 4–5 kg/ha gave complete control of *Agrostis* spp. and some control of *Agropyron repens*. *Cirsium arvense* and *Echinochloa crus-galli* showed considerable resistance to simazin. In yellow lupins grown for seed, good weed control without damage to the crop was achieved with 1·5 kg simazin/ha applied either before emergence or at the 2-leaf stage. Simazin at 0·5 kg/ha controlled weeds in lupins sown in cereal stubble. In preliminary trials with stubble-sown serradella, simazin caused considerable crop damage. Simazin has shown considerable promise in preliminary trials against wild oats.—R.B.

92 RIJKSLANDBOUWHOGESCHOOL GENT. Nawerking van simazin, aangewend in maïs, op de opvolgende teelten. [**The residual action of simazin, applied to maize, on the crops which follow.**] *Versl. Centr. Onkruidonderz. 1958* [n.d.], 6.

Simazin applied to maize at 0·6–2·5 kg/ha caused no apparent damage to following crops. Applications of 5 kg/ha damaged winter cereals ; 10 kg/ha damaged spring cereals and prevented the establishment of red clover.—R.B.

93 COITEUX, F. and BORDELEAU, R. L'usage des herbicides dans le Québec. [**The use of herbicides in Quebec.**] *Rev. d'Oka* 1959, **33**, No. 1, 1–6, illus. [Ferme exp. Fed., L'Assomption, Quebec]

Sweet-corn and maize for silage grown in adjacent rows were treated one day after sowing with 3·6 lb. dinoseb/ac., or 24 oz. a.e. 2,4-D butoxyethanol ester/ac., or 2 lb. simazin/ac. to control *Chenopodium album, Stellaria media, Plantago* sp., *Polygonum persicaria, P. convolvulus, Cirsium arvense, Capsella bursa-pastoris* and *Agropyron repens*. Simazin gave the best weed control and had no adverse effect on a following crop of oats under-

sown with a grass/legume ley. Yields of maize from plots treated with simazin and dinoseb exceeded those from weeded control plots. Endothal at 2·5 lb./ac. in combination with 8 lb. CDAA/ac., 4 oz. CP 18–15/ac., 6 lb. EPTC/ac., or 3 lb. CIPC/ac., or 7·3 lb. DCU + 6 lb. EPTC/ac., were applied to sugar-beet 1 day after sowing in order to control *Amaranthus retroflexus* and all of the above-mentioned weeds, except *C. bursa-pastoris*. Endothal + CDAA gave the best weed control, followed by endothal + CP 18–15. Yields of roots were greatest on plots treated with endothal + EPTC or CP 18–15. All treatments resulted in considerably higher yields than unweeded controls.—R.B.

94 Stephens, D. **Experiments on the chemical control of weeds in maize in Ghana.** *Pest. Abstr.* (*C*) 1958, **4**, No. 4, 225–32, bibl. 1.

In trials during 1956 at 3 locations in the 2-peak rainfall belt of Ashanti, maize was subjected to different weeding treatments and rates and dates of application of MCPA. Rates of MCPA used were 0·5 and 1 lb. a.e./ac. and times of application were 3–5 days after sowing (pre-emergence), and when the plants were 4 or 8 in. high. No treatment affected maize growth. Both rates of MCPA effectively controlled weeds. Maize yields were significantly increased only by the 1 lb./ac. rate, which was more effective than the 0·5 lb./ac. rate in the early part of the season. The pre-emergence treatment gave the best weed control early in the season. One hand-weeding treatment (at about 5 weeks after sowing) was significantly more effective than the MCPA treatment in reducing weed stands late in the season. In trials in 1957 with MCPA and 2,4-D amine and ester, pre-emergence treatment with 2,4-D amine was the most effective. Applications of 0·9 lb. a.e. MCPA at 3–5 days after sowing, followed by 1·1 lb. a.e. 2,4–D amine when the plants were 6 in. high, were about twice as effective as either treatment used singly. Hand-weeded plots had the highest yields and all treatments significantly increased yields compared with untreated controls. There was evidence that early control of weeds by pre- and post-emergence herbicidal treatments resulted in yield increases which were relatively independent of those produced by subsequent hand-weeding and that such herbicidal treatments were best used as additions, and not as alternatives to hand weeding. A list of the weeds commonly found in these trials is given.—P.J.B.

95 Rowland, J. W. [**Weed control in maize.**] *Rep. Sec. Fed. Minist. Agric. Rhod. and Nyasald 1958*, 1959, 97. [Henderson Res. Sta., S. Rhodesia]

In experiments with maize, 2 cultivations combined with the application of 1 lb. a.e. of MCPA, or 2,4-D ester or 2,4-D amine/ac. gave good weed control. Plots receiving 2,4-D ester combined with 2 cultivations gave the highest yields, with 22·8 bags/ac. [1 bag = 200 lb.]—S.M.J.

96 Salas, L. and Ruppel, R. F. Efectividad de insecticidas aplicados en polvo para controlar las principales plagas del fríjol y del maíz almacenados, en Colombia. [**Effectiveness of insecticidal dusts for controlling the principal pests of stored kidney bean and maize, in Colombia.**] *Agric. trop., Bogotá* 1959, **15**, No. 2, 93–108, bibl. 18.

97 Ermilov, G. B. [**A method for examining the growth of maize plants.**] [Russian] *Bot. Ž., SSSR* (*Bot. J., USSR*) 1959, **44**, No. 6, 805–7. [Sverdlovsk]

The productivity of maize [i.e. crude weight] is usually estimated by measuring the height of the plants. As this method is frequently subject to error for various reasons, the author suggests that the average diameter of the lower part of the stems is a more reliable criterion from which yields may be estimated. The relation between the crude weight of plants in a sowing on 70 × 70 cm. plots (2 plants per pocket) and the average diameter of the lower stems is expressed by the formula $y = 1{\cdot}97x^2 - 37x + 100$, where y = weight of the green plants (in g) and x = diameter of the stems above the lowest node (in mm.).—M.H.

98 I'Só, I. Kisérleti adatok a kukorica fattyazásanak élettani hatásához. **Experimental analysis of the physiological role of tillers in maize.** *Növénytermélés* 1959, **8**, No. 2, 119–24, bibl. 8, English summary. [Agric. Res. Inst., Martonvásár, Hungary]

99 Grinfel'd, E. G. [**Problems on the biology of flowering in maize.**] [Russian] *Agrobiologija* (*Agrobiology, Moscow*) 1959, No. 1, 86–70. [Stalingrad State Agric. Exp. Sta.]

There is information on : the intensity of flowering (anthesis) during the course of the day in relation to air temperature ; duration of flowering in the male inflorescences in relation to spacing of the plants ; and viability of the pollen.—M.H.

100 Ingle, M. and Rogers, B. J. **Physiological responses of corn [maize] roots to dalapon.** *Proc. 15th N. Cent. Weed Contr. Conf.* [USA] 1958, 4–5. [Purdue Univ., Lafayette, Indiana]

101 Bange, G. G. J. **Interactions in the potassium and sodium absorption by intact maize seedlings.** *Plant and Soil* 1959, **11**, No. 1, 17–29, bibl. 13, illus. [Fdn Res. Pl. Nutr., Leiden, Netherlands]

In water-culture experiments with maize seedlings, absorption of Na by roots appeared to be strongly inhibited by excess K, while K absorption was only partially inhibited by excess Na. —R.B.

102 Lanza, F. Alcune osservazioni sugli equilibri ionici nella nutrizione minerale del mais. [**Some observations on ion equilibria in the mineral nutrition of maize.**] *Maydica* 1959, **4**, No. 2, 62–3, English and German summaries. [Sta. Sper. Maiscolt., Bergamo, Italy]

The results from trials in 1958 indicated that the optimal equilibrium of nutrients for maize is 65–80% NO_3^-, 10–17% PO_4^{---} and 10–16% K^+. —E.B.O.

103 Davidesco, E. Contributions au diagnostic de l'insuffisance de la nutrition manganesienne. [**Contributions to the diagnosis of Mn-defiency in plant nutrition.**] *Rep. World Congr. agric. Res. Rome*, 7–9 May, 1959, pp. 4, bibl. 5, English, German, Spanish and Italian summaries.

In the pot trial described, maize plants of the variety Romînesc de Studina were grown in red-brown forest soil or sand as follows : (a) 100% sand ; (b) 75% sand, 25% soil ; (c) 50% sand, 50% soil ; (d) 100% soil. The plants were fed with a nutrient solution from which Mn was omitted. External symptoms (described) of Mn-deficiency appeared 60 days after sowing, and were more evident in (a) than in (b), (c) and (d), where there was a reserve of Mn. The growth of Mn-deficient plants was retarded, and their seed production was reduced, or was nil.—E.B.O.

104 Schauble, C. E. and Barber, S. A. **Magnesium immobility in the nodes of certain corn inbreds.** *Agron. J.* 1958, **50**, No. 11, 651–3, bibl. 6. [Purdue Univ. Agric. Exp. Sta., Lafayette, Indiana]

Maize plants of the inbred lines Indiana WF9 and Ohio 40B grown in a glasshouse and in the field were subsequently analysed for Mg, N, P and K. Ohio 40B accumulated more Mg in the upper outer portion of the nodes than did Indian WF9. There was very little difference in the P or K content of corresponding nodal portions of the 2 varieties and there was no evidence of the presence of a protein-Mg complex in the nodes, nor of any difference in node morphology. Leaves of Indiana WF9 contained more P, K and Mg than did leaves of Ohio 40B. The K content of Ohio 40B grain was about 33% greater than in Indiana WF9, while the Mg and P content was similar in the grain of both varieties. It was suggested that Mg accumulation in Ohio 40B nodes was caused by a deficiency in the metabolic system responsible for Mg translocation.—R.B.

105† Ehara, K. and others. **Studies on the growth behaviour and quality of the forage crops in warm area in Japan. 3. Effect of nitrogen fertilizer on the growth behaviour, structure, and chemical composition of the fodder corn [maize].** *Bull. Kyushu Agric. Exp. Sta.* 1958, **5**, 99–110, bibl. 18.

106 Shalhevet, J. **Nitrogen response of corn [maize] under variable conditions of drainage.** *Diss. Abstr.* 1959, **19**, No. 12, 3080. [Cornell Univ., Ithaca, New York State]

107 Zubenko, V. H. [**The effect of presowing hardening of seeds, to increase drought resistance, on yields of maize grown as a stubble crop.**] [Russian] *Fiziol. Rast. (Pl. Physiol., USSR)* 1959, **6**, No. 3, 333–5, bibl. 4. [Kuban Agric. Inst. Krasnodar]

In the Kuban [45°N., 39°E.] after the harvest of a grain crop, there remain more than 100 days before the onset of frost. This period is adequate to obtain a harvest from a stubble crop, for which maize is the most suitable. However, maize requires a good supply of moisture and in the lowland part of the Krasnodar Territory summer droughts are frequent. To increase the drought resistance of maize, the method described by Henkel' (*Trudy Inst. Fiziol. Rast.* 1946, Vol. 1) is advocated, the most effective hardening being obtained by soaking the seeds once or twice (for 24 hr.) and after each soaking drying them to an air-dry condition. Such prehardened seed proved satisfactory for sowing at the end of June when air temperature averaged 25–27°C.—M.H.

108 Ellis, R. T. **The food properties of flint and dent maize.** *E. Afr. agric. J.* 1959, **24**, No. 2, 251–3, bibl. 3. [Dep. Agric. Nyasaland]

The majority of maize varieties in the world are dent, but, in Nyasaland, Africans prefer flint varieties. Results of trials there showed that when the local method of extraction is used, flint varieties yield a higher proportion of flour than dent varieties.—J.D.J.

109 Coaker, T. H. "**Insack**" **treatment of maize with insecticide for protection against storage pests in Uganda.** *E. Afr. agric. J.* 1959, **24**, No. 4, 244–50, bibl. 4, illus. [Emp. Cott. Gr. Corp., Namulonge, Uganda]

Because of the local climate and cropping sequence, maize grain is harvested at 25% moisture content, dried in the sack to 12%, and treated with insecticide. Using an injector designed at Namulonge, insecticide is introduced into each bag at 6 points. Injection is facilitated by the fact that the bags are only three-quarters full after drying. The bags are then tumbled for four minutes in a rotary mixer. The method is not quite as efficient as

mixing loose maize in a rotary drum, followed by bin storage, but is easier and gives adequate protection for one season.—J.D.J.

110 Department of Agriculture, Nyasaland Protectorate. **Maize.** *Rep. Dep. Agric. Nyasald 1957-8 Pt 2*, Zomba, 1959, 7–22.

The results are given of various maize variety trials, including one in which 29 varieties and hybrids were tested at 5 centres. Local Hybrid No. 7 was the highest yielding. It has flint-type grain and long husks, and is potentially useful for commercial production. At Makanga, spraying twice weekly with 2 lb. zineb in 200 gal. water/ac. to control leaf diseases had no significant effect on yield, but at Chitedze yield was increased by 7·3% (509 lb. grain/ac.). Results of fertilizer and population trials at 5 centres are given. Except after a newly ploughed Napier grass ley, there was no fall-off in response to increasing amounts of N up to 300 lb. ammonium sulphate/ac. Plant population affected yield significantly at Tuchila and Chitala. With the local selection used, yield was highest at 12,000–14,000 plants/ac., whereas in the previous year hybrid maize yielded most at higher population levels. Ammonium sulphate (100 or 200 lb./ac.) was applied at sowing, at 30 days after sowing, or at first tassel, in either single or split dressings. Time of application had no significant effect on yield. The results of district fertilizer trials were used to calculate average responses to ammonium sulphate on different soil types. It was concluded that it is profitable to apply 100–200 lb. ammonium sulphate/ac., except on certain alluvial and riverine soils in the Lower Shire and Karonga Lake-shore, on richer and better cultivated red soils on the Dowa-Lilongwe plateau and in the Dedza Highlands. In a trial at Chitedze, late weeding (23 Jan.) decreased yield by an average of 804 lb. grain/ac., compared with early weeding (8 and 14 Jan.). Sowing 2 weeks after the first rains on 19 Nov., instead of sowing dry on 18 Nov., reduced yield by an average of 1148 lb./ac. In the 3rd year of a trial on methods of soil preparation in Oct., split ridges gave better germination and generally higher yields than made-up ridges. It was not profitable to remove stover unless it was later returned as manure. On a short-term basis there was little to choose between burning and burying stover. In a trial on the combined effects of insecticide treatment and sowing date, sowing before the rains gave the highest yield and yield progressively decreased as sowing was delayed until the first rains, or later. One application of 10 lb. 5% DDT/ac. or 2 applications of 7·5 lb. 5% DDT/ac. increased yield by 20% in the early-sown plots and by 15% on all plots.—A.M.H.

111 Tattersfield, J. R. [**Maize.**] *Fld Crop Expts Gwebi 1954/5-1956/7*. [cont. in] *Rhod. agric. J.* 1959, **56**, No. 1, 13–16, bibl. 10.

In experiments in which maize was grown in rotation with annual crops, it was confirmed that late sowing of maize greatly reduced the yield of grain. Yields were increased by applying 300–500 lb. $(NH_4)_2SO_4$/ac. as top-dressings, though applying more than 300 lb./ac. resulted in little further yield increase. In trials, hybrids generally yielded more, appeared less liable to lodge, and had a greater ratio of grain to stover than open-pollinated varieties. In experiments where maize followed Napier grass [*Chloris gayana*] highest grain yields resulted from applications of 100 lb. N (as $(NH_4)_2SO_4$)/ac. at sowing and 30 lb. N/ac. as a top-dressing. In the second year, the effect of top-dressings was more marked than in the previous season and the best treatment was 120 lb. N/ac. as a top-dressing, without any basal dressing. Applying 200 lb. N/ac. in close proximity to the seed at the time of sowing significantly reduced the plant stand because of reduced emergence. Pre-emergence treatment of maize with formulations of 2,4,-D and MCPA were more effective than post-emergence applications. Phytotoxicity was highest where 2 lb. a.e. MCPA or 2,4-D (butylester) /ac. were applied.—M.A.

SORGHUMS AND OTHER MILLETS

See also Abs. 348, 488.

112 Barontini, F. Il sorgo ibrido, altra grande conquista. [**Hybrid sorghum, another great acquisition.**] *Ital. agric.* 1959, **96**, No. 4, 297–305, bibl. 7, illus.

Information is given on hybrid sorghum, the growing of which has spread in Italy in 1958, mainly in the north. The hybrid S_1, for grain, is the type almost exclusively grown, but others are under trial. Grain yields vary from 9000–10,000 kg/ha on the best soils to 3000–3500 kg/ha on sloping arid soils. The grain, leaves and stalk also are used for fodder. No cases of sorghum poisoning are reported.—E.B.O.

113 Zucchini, I. Il sorgo ibrido come alternativa al granoturco. [**Hybrid sorghum as an alternative to maize.**] *G. Agric. Domen.* 1959, **69**, No. 14, 131, illus.

In trials near Rome and other regions in central and southern Italy, sorghum hybrids introduced from the USA gave high yields of grain and fodder and were more resistant to drought and better adapted to low fertility conditions than maize. The highest grain yields were obtained from Camelsorghum 59, 65 and 210, and the highest fodder yields from Soave, followed closely by Camelsorghum BF, which also produced aftermath yield.—E.B.O.

114 Bajai, J. Vetésmód-kisérletek korai fehér szemescirokkal (Early Hegari) az 1955–57. években. **Studies on different sowing pro-**

cedures for white early seed-sorghum (Early Hegari) in 1955-57. *Növénytermelés* 1959, **8**, No. 2, 111–18, bibl. 10, illus., English summary. [Agric. Res. Inst., Martonvásár, Hungary]

115 YELIGAR, B. B. and others. **Effects of various rotations on jowar.** *Mysore agric. J.* 1958, **33**, No. 4, 202–8, bibl. 9. [Agric. Res. Sta., Dharwar, Mysore, India]

The effect of a preceding crop upon the yield of sorghum var. Nandyal was studied in 1951–8. Compared with yields from a sorghum/cotton rotation, the sorghum yields obtained under other rotations were as follows, for grain and fodder, respectively : continuous sorghum with FYM in alternate years, 18 and 25·5% lower ; groundnut/sorghum, 21 and 27·5% higher ; groundnut/sorghum + FYM (rate as for sorghum/cotton rotation), 35 and 50% higher ; groundnut/sorghum/cotton, 59 and 58% higher. If, in the 3-course rotation, cotton preceded sorghum the grain and fodder yields were only 16·7 and 21·4% higher than normal.—D.B.

116 BROWN, P. L. and SHRADER, W. D. **Grain yields, evapotranspiration, and water use efficiency of grain sorghum under different cultural practices.** *Agron. J.* 1959, **51**, No. 6, 339–43, bibl. 8. [Fort Hays Br. Exp. Sta., Hays, Kansas]

Martin grain sorghum was grown under conditions of drought in 1954 and '55 in rows spaced 10, 20 and 40 in. apart in soil wet to field capacity to depths of (a) 3, (b) 5 and (c) 7 ft. at sowing time. Plant populations were 15,680, 31,360, 47,040 and 62,720 plants/ac. on (a) plots, and 31,360, 62,720, 94,080, and 125,440 plants/ac. on plots (b) and (c). Average grain yields in bu./ac. in 1954 and in extreme drought in 1955 were, respectively, for (a) plots, 21 and 1·7, for (b), 35·6 and 11·6, and for (c), 48·2 and 33·1. Average evapotranspiration per growing season during the 2-yr. period was 11·6 in. for (a) plots, 14·8 in. for (b), and 17 in. for (c), of which 49, 60 and 65%, respectively, was supplied by soil moisture present at sowing. The optimum respective plant populations per ac. in 1954 and '55 were : (a) plots, 15–30 thousand and 15,000 ; (b) plots, 60,000 and 30,000; (c) plots, 60–90 thousand and 30–90 thousand. The optimum row spacing was 20 in. in 1954 and 40 in. in 1955. Water-use efficiencies on plots (a), (b) and (c) were 1·8, 2·4 and 2·8 bu./in. of water/ac. in 1954, and 0·16, 0·8 and 2·0 bu./in. in 1955. Water-use efficiency for grain production in 1955 was increased by wide row-spacings and low plant-populations, and was inversely related to the production of leaves plus stems.—R.B.

117 VARGAS, R. and ROJAS, E. Comparativo de variedades de sorgo escobero. [**A trial to compare varieties of broom sorghum.**] *Bol. trim. Exp. agropec., Lima* 1958, **7**, No. 3, 23–8, bibl. 2. [Esta. Exp. Agríc., La Molina, Peru]

In a trial to compare the varieties White Station, Rennel and Tennessee from the USA with the local variety of broom sorghum, Rennel and White Station were best and gave 1405 and 1288 kg/ha of good quality fibre, and 3918 and 3677 kg of seed per ha, respectively. The local variety gave a high yield of poor quality fibre (1367 kg/ha) and a low seed yield.—E.B.O.

118 TALBERT, R. E. and FLETCHALL, O. H. **Neburon for pre-emergence weed control in grain sorghums.** *Proc. 15th N. Cent. Weed Contr. Conf.* [USA] 1958, 13. [Missouri Agric. Exp. Sta., Columbia]

In trials in Missouri, applications of 2 or 4 lb. neburon/ac. effectively controlled a range of grass and broad-leaved weeds. Pre-emergence treatment of sorghum with 1, 2 or 4 lb. neburon/ac. held weed growth in check for 4, 6 and 9 weeks respectively, and had no appreciable effect on the stand and height of the sorghum. In glasshouse studies, there was little difference between 2,4-D and neburon in their respective toxicity to sorghum.—P.J.B.

119 WEBSTER, O. J. and LEUKEL, R. W. **Sorghum seed-treatment tests in 1958.** *Pl. Dis. Rptr* 1959, **43**, No. 3, 348–9. [Crop Res. Div., U.S. Dep. Agric.]

Tabulated results are given from field trials to test several mercurial and non-mercurial fungicides on glume-free seed of Combine-60 kafir and on glumed seed of Rancher sorghum, with regard to their effect on germination, field stands and control of covered kernel smut (*Sphacelotheca sorghi*). At Beltsville where infection averaged 54 and 37% in the controls, phygon, spergon and several mercurial preparations gave complete control of smut.—E.B.O.

120 BURKHARDT, C. C. **Increasing sorghum stands in field tests by controlling thief ants and other insect pests.** *J. econ. Ent.* 1959, **52**, No. 3, 365–8, bibl. 5. [Kansas Agric. Exp. Sta., Manhattan]

Stands of Atlas sorghum grown in areas infested with *Solenopsis molesta* ants were increased by 180% where seed was treated with 1 oz. dieldrin/100 lb. seed. Stand increases of 26–368% occurred in plots of 14 grain sorghum varieties where seed was treated with 2·5 oz. of a 60% captan/15% dieldrin mixture. In areas infested with *Solenopsis molesta* ants and *Agonoderus lecontei* beetles, seed treatment with lindane, dieldrin or heptachlor, with or without captan, increased sorghum stands by 2–571%. Sorghum treated with fungicide/insectide mixtures yielded 63 bu./ac., while sorghum treated with insectide alone yielded 46 bu./ac. Where fungicide-treated sorghum seed was

sown in soil treated with 1·5 lb. dieldrin/ac., 2 lb. aldrin/ac. or 2 lb. heptachlor/ac., yields were increased by 112–514%.—R.B.

121 PATIL, J. A. **Bajri (*Pennisetum typhoides* S. and H.) in Bombay.** *Poona Agric. Coll. Mag.* 1959, **49**, No. 4, 265–77, bibl. 6.

This paper gives a general account of the cultivation of *P. typhoideum* and includes climatic and soil requirements, soil cultivation, rotations, varieties, diseases and pests and their control. This account is followed by a brief record of research in progress on this millet at various research stations in India.—D.B.

122 HUGHES, R. **The agronomic characteristics of lines of millet (*Pennisetum* sp.) from different sources.** *J.W. Afr. Sci. Ass.* 1958, **4**, No. 2, 128–40, bibl. 4. [Univ. Coll. Ghana, Achimota]

123 SHAH, H. C. and MEHTA, B. V. **Magnesium-phosphorus-crude fat interrelationships in the seed of pearl millet (*Pennisetum typhoideum—Rich.*).** *Soil Sci.* 1959, **87**, No. 6, 320–4, bibl. 11. [Inst. Agric. Anand, India]

Determinations were made of Mg, P, Ca, K and crude fat contents in the seed of 96 samples of pearl millet variety 207 grown for each of 3 seasons, monsoon 1956 and 1957, and summer 1957, with different fertilizer treatments on sandy loam soil. It was found that Ca and Mg were inversely related and that Mg was present in higher amounts than Ca. Of the 3 elements, Mg, P and K, generally believed to be associated with the formation of crude fat in plants, only Mg was found to have a direct and significant role in crude-fat formation.—E.B.O.

124 VITKOVSKAJA, V. V. **[Carotene dynamics in ontogeny of proso millet.]** [Russian] *Zap. Leningr. sel'sk. Inst. (Papers Leningrad Agric. Inst.)* 1958, No. 13, 86–9, bibl. 6. [Received July, 1959]

There is evidence that the maximum carotene content in *Panicum miliaceum* occurs at the 4th developmental stage in plants when grown either in 12 hr. photoperiod or in the long [18 hr] day-length of the Leningrad Province.—M.H.

125 GŽESJUK, S. **[Certain features of the passing of the photophase in proso millet.]** [Russian] *Zap. Leningr. sel'sk. Inst. (Papers of Leningrad Agric. Inst.)* 1958, No. 13, 13–20, bibl. 19. [Received July, 1959]

The study was designed to determine what changes in the shoot apex take place at the beginning and end of the photophase in *Panicum miliaceum*. The tests show that the beginning of the photophase coincides with the beginning of differentiation in the apex, and the end of the photophase with the appearance of anther rudiments in flowers of the upper spikelets of the inflorescence. The formation of pollen-mother-cells begins 8–10 days after the photophase. Thus, between the end of the photophase and the formation of sexual cells (the criticial period) there is, in proso, another period of development, the duration of which varies with different varieties. By transferring plants which pass the photophase in long day to short-day conditions, the curious phenomenon is observed of short-day retarding development. The plants are then profoundly changed, leading to sterility of the ears. By transferring plants from short-day to long-day conditions at the beginning of tetrad formation, a change in grain colour results, which is an inherited feature. The duration of the photophase varies in different varieties in short-day as well as in long-day conditions, and there is a difference also in the length of the 3rd period of development. The duration of these phases depends primarily on the ecological conditions in which the varieties are grown.—M.H.

126 RATNASWAMY, C. **Tiller and main shoot relationship in *Setaria italica* Beauv. (Tenai or the Italian millet).** *Madras agric. J.* 1959, **46**, No. 2, 43–51, bibl. 9, illus. [Millet and Pulses Breeding Sta., Coimbatore]

The origin, development and physiology of primary and secondary tillers in *Setaria italica* were studied. Primary tillers develop from nodes at the base of the main stem and have roots which function independently of the main culm yet can supply surplus nutrients to it. Secondary tillers arise at nodes above soil level, have no roots, and are dependent on the main culm for nutrient supplies.—D.B.

127 SITHAMPARANATHAN, J. **Improvement of highland crops in the dry zone. 1. Cereals and millets.** *Trop. Agriculturist* 1958, **114**, No. 1, 19–28, bibl. 2. [Dep. Agric., Ceylon]

This article reviews recent progress in the search for cereal varieties suitable for the dry zone of Ceylon. Sorghum was introduced into Ceylon about 1930. In trials with new introductions the highest yielding varieties of grain sorghum included both lax- and stiff-panicled types, viz. C.O.2, C.O.3, Sanpyaung (tall open lax-panicled varieties), A.S. 475, I.P.I.-Jowar 3 (medium height, lax-panicled varieties), Fulgar White, Tambagala and Combine Black Kaffir (stiff, semi-compact panicled varieties). Of the introduced fodder sorghums tested, Sweet Honey was consistently best ; its green-matter yields averaged 15 tons/ac. without fertilizers. Several millets are important as grain crops. Finger millet (*Eleusine coracana*) is the most widely grown cereal in the maha season,

being particularly suited to the poorly drained lower slopes which are too moist for maize or sorghum. Meneri (*Panicum miliaceum*), the most common cereal in the yala season, matures its grain in a very short time. Bulrush millet (*Pennisetum typhoideum*), recently introduced, is a promising cereal crop. Both *Setaria italica* and *P. typhoideum* are drought-resistant.—E.B.O.

RICE

See also Abs. 392, 401.

128 Van der Meulen, J. G. J. **Report to the Government of Tanganyika on rice production.** *Rep. 919 FAO* 1958, pp. 34.

This survey of rice-growing in Tanganyika was carried out to assist the Government of that territory to formulate a programme for rice development. It is concluded that there are great possibilities for developing rice-growing in those areas of Tanganyika where irrigation schemes are being studied, provided that suitable varieties are obtained. In particular, prospects are good in the Ruvu Basin. A summary of recommendations is given.—E.B.O.

129 Mouton, J. A. Riziculture et déforestation dans la région de Man, Côte d'Ivoire. [**Rice-growing and deforestation in the Man region, Ivory Coast.**] *Agron. trop., Nogent* 1959, **14**, No. 2, 225–31, bibl. 8, illus., English and Spanish summaries.

Information is given on the growing of upland rice in Man, a region bordering French Guinea and Liberia. The climate is tropical with one rainy season and 4 dry months (Nov.-Feb.). The rapid increase in population during the past 20 years has resulted in deforestation which is considered responsible for a decreased annual rainfall and a longer dry season.—E.B.O.

130 Walter, C. La coltivazione del riso nella Repubblica Dominicana. [**Rice-growing in the Dominican Republic.**] *Riso* 1959, **8**, No. 4, 6–8, illus.

131 Rosher, P. H. **The spacing of swamp rice in Trinidad.** *Emp. J. exp. Agric.* 1959, **27**, No. 107, 223–34, bibl. 14, (Imp. Coll. Trop. Agric., Trinidad)

A series of experiments to find the optimum spacing, population and arrangement of swamp rice seedlings showed that rice transplanted in hills 6 in. apart, if family labour is used, and 8 in. apart, using hired labour, gave the highest economic returns. Tillering was increased by placing more than 3 plants in a hill occupying an area of about 324 sq. in. The varieties Joya, Kalyman, D52–37 and D110, were used. Yields and number of panicles per hill are tabulated.—S.M.J.

132 Kanda, M. and Kakizaki, Y. **Studies on the spacing density of rice plants. 3. Interrelationships between the spacing density and the mode of hill arrangement.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 177–8, bibl. 2, English summary [Tohoku Univ.]

With the same density of planting, the maximum grain yield per unit area was obtained when the ratio of the distance between rows to distance between hills in a row was 2 : 1 or 3 : 1. F. Eng. S.—D.B.

133 Have, H. ten. Proefnemingen over de optimale zaaidichtheid van verschillende rijstrassen onder uiteenlopende groeiomstandigheden. **Experiments about the seeding-rate of some rice varieties under different growing conditions.** *Surinaam. Landb.* 1959, **7**, No. 1, 1–12, English summary. [Stichting Machinale Landbouw in Suriname, Paramaribo]

Germinating seed of 6 rice varieties was sown at rates ranging from 35 to 135 kg/ha on flooded heavy clay soil receiving sulphate of ammonia at rates of nil up to 275 kg/ha. Under good growing conditions the average grain yield without N was 6219 kg/ha after a green manure crop of *Crotalaria* sp. and 4930 kg/ha after soyabeans ; the optimum seed rate was 85 kg/ha where no N was applied, 60 kg/ha with 100 kg sulphate of ammonia, and 35 kg/ha with 150 kg sulphate of ammonia. Under moderate growing conditions, the average yield without N was 3261 kg/ha, and the optimum seed rate was 100 kg/ha irrrespective of manurial treatment. Under poor growing conditions, the average yield without N was 2098 kg/ha, and highest yields were obtained at the highest seed rates only. Under all conditions, the optimum seed rates were the same for the main crop sown in April as for the late crop sown in Oct., and were slightly lower for Paradijs than for other varieties. Applied N increased the percentage lodging to a greater extent than did high seed rates.—R.B.

134 Riso. Danni della mutilazione totale delle radici di piante di riso al trapianto. [**Damage caused by the total mutilation of the roots of rice plants at transplanting.**] *Riso* 1959, **8**, No. 4, 15–17, illus. [Sta. Sper. Risicolt., Vercelli, Italy]

In connexion with mechanized transplanting of rice, the question has been raised whether rice plants would suffer greatly if they were deprived of those roots which are left on the plants after removal from the nurseries. In a plot trial, rice plants, 60 days old and 40 cm high, were removed from the nurseries on 30 June, 1958, and their roots were cut off before transplanting. Although new roots formed rapidly on the mutilated plants, these plants yielded 17% less grain, 13% less straw and tillered 15% less than the controls.—E.B.O.

135 HAVE, H. TEN. De invloed van de waterhoogte op de groei van het rijstgewas. **Influence of depth of water on the growth of rice.** *Surinaam. Landb.* 1959, **7**, No. 1, 13–20, English summary. [Stichting Machinale Landbouw in Suriname, Paramaribo]

Rice seedlings were grown in pots submerged in water to depths between 0 and 28 cm above soil level. Where clean irrigation water was used, 60% of seedlings emerged through a water layer of 10 cm, and 52·5% through a 20-cm layer. Using muddy irrigation water, 40% of seedlings emerged from water 10 cm deep, and 29% from water 20 cm deep. The greater the water depth, the more rapidly did the seedlings elongate. The number of fertile tillers produced per plant was greater where plants were submerged to a depth of 10 cm than where submerged to 25 cm. In field trials where rice was grown for 35 days in water 10 cm deep and subsequently in water 10 or 25 cm deep, yields were reduced by 300 kg grain/ha, mainly because of reduced panicle weight where the higher water level was used. In further trials, an increase of 13 cm in the depth of water, maintained throughout the growing season, reduced yields of grain by 650 kg/ha. High water levels encouraged lodging, retarded flowering and led to uneven ripening. Adequate weed control could be achieved by maintaining the water level at 15–20 cm between 3 and 7 weeks after sowing, and at 10 cm thereafter. Weeds such as *Sphaenoclea zeylanica* and *Nymphoides* sp. were effectively controlled by dense crop stands. —R.B.

136 HAVE, H. TEN. De invloed van het tijdstip van de oogst op de kwaliteit van enkele rijstrassen. 2. **Effect of date of harvest on the quality of some rice varieties. 2.** *Surinaam. Landb.* 1958, **6**, No. 6, 201–9, bibl. 5, English summary. [Stichting Machinale Landbouw in Suriname, Paramaribo]

The percentage of cracked and broken grains in rice harvested in 1956 and '57 [See *Fld Crop Abstr.* 12 : 1226] was investigated. Poor growing conditions in 1957 caused cracking of grain to appear earlier and reach higher values than in 1956. Samples of grain from crops sown in late 1956 and in 1957 were sorted according to moisture content at harvest and dried to 10·8–12·8% moisture at a constant temperature of 55°C. or in the sun, and the percentage of cracked grains before and after drying was determined. Where rice was dried at 55°C., the percentage of cracked grain increased considerably as the moisture content prior to drying increased. The increase in percentage of cracking during sun-drying was much smaller and was negligible where grain of less than 16% moisture was dried. A comparison between the moisture content at harvest, the percentage of cracked grains in undried rice, and the percentage breakage during milling and polishing for 349 samples indicated that the best time for harvesting was when the grain contained 19–21% moisture.—R.B.

137 KODAMA, T. and others. **Studies on the deep tillage in upland field. 1. The growth habits of upland rice plant in deeply plowed field.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1959, **27**, No. 3, 375–6, bibl. 4, English summary. [Kanto-Tosan Agric. Exp. Sta.]

Rice yields were higher when soil was ploughed to a depth of 45 cm than to a depth of 12 cm (standard treatment). This was attributed to increased porosity and nitrate content of the soil and consequently greater root development. F. Eng. s.—D.B.

138 BALASUBRAMANIAN, C. **Climate-yield relationship of paddy in Kanyakumari (Madras).** *Rice News Tell.* 1959, **7**, No. 1, 3–8. [Seed Farm, Nagercoil]

In Kanyakumari District of Madras rainfall ranges from 20 in. near the coast to 150 in. on the hills. 17 years' data were collected on daily rainfall and on grain and straw yields of the 1st crop of rice (April/May to Aug./Sept.) and of the 2nd crop (Aug./Sept. to Jan./Feb.). The influence of patterns of rainfall throughout growth on the yields of grain and straw were studied. Correlations show that the best time for sowing the first crop (which is broadcast) is from 25 April to 15 June, and for transplanting the second crop from late September to the third week in October. The critical periods during which the pattern of rainfall influences yield are : for the first crop, from 15–28th day and 57–70th day after sowing ; for the second crop, after seedling establishment and at flowering. The weather during the growth period of the first crop favours grain rather than straw, the grain to straw ratio ranging from 1·2 to 1·5.—D.B.

139 UMINO, S. and others. **Studies on methods of lowland rice culture on upland fields under irrigation. 1. Adaptability of lowland rice varieties to the cultivation on upland fields under irrigation. 2. Differences in the growth and physiological characteristics between lowland rice and upland rice cultivated on upland field under irrigation.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1959, **27**, No. 3, 349–53, bibl. 7, English summary. [Kanagawa Agric. Exp. Sta.]

Early-ripening lowland varieties of rice yielded better than medium-ripening lowland varieties when grown under irrigation in upland regions. The lowland early variety Obanazawa No. 6 was highly adapted to cultivation on upland fields under irrigation. When compared with Norin No. 12 (an upland variety with the same heading date as Obanazawa No. 6) the lowland variety

proved superior to the upland variety in number of spikelets per panicle, percentage of ripened grains and ear/straw ratio. F. Eng. s.—D.B.

140 Piacco, R. 2. Le principali varietá di riso : il Maratelli. [**2. The principal rice varieties (in Italy) : Maratelli.**] *Riso* 1959, **8**, No. 4, 9–11, illus.

141 Buffa, G. **" Colosso " o " R.3."** *Sementi elette* 1959, **5**, No. 2, 50–3, illus.

The charactistics are given of the new Italian rice variety, Colosso or R.3, a fine type which yielded 8700 kg per ha in the province of Bologna. —E.B.O.

142† D'Amato, F. Osservazioni preliminari sulla flora e vegetazione delle risaie e delle paludi a N. del Lago di massaciuccoli (Versilia). [**Preliminary observations on the flora and vegetation of rice-fields and marshes north of the Lake of Massaciuccoli (Versilia, Italy).**] *Nuovo G. bot. ital.* 1957, **64**, No. 1–2, 153–84, bibl. 21, illus., English summary. [Ist. Bot. Univ. Firenze] [Received Oct., 1959]

An annotated list is given of plant species present, which include many grasses and legumes. —E.B.O.

143 Ciferri, R. Evoluzione della vegetazione infestante nelle risaie pavesi. [**Evolution of weeds in the rice fields of Pavia province (Italy).**] *Riso* 1959, **8**, No. 5, 16–18, illus.

See also *Fld Crop Abstr.* 12 : 1233.

144 Stephens, D. **Weed control in swamp rice in Ghana.** *Pest. Abstr. (C)* 1958, **4**, No. 4, 233–7, bibl. 3.

In trials during 1956 and '57 at 1 location in Ashanti and at 2 in northern Ghana, rice was treated in 1956 with MCPA, 2,4,5-T and 2,4-D at 6–8 weeks after sowing and in 1957 with dalapon 6–8 weeks before sowing, monuron immediately after sowing, MCPA at 40–50 days after sowing or with combinations of the dalapon + MCPA or the monuron + MCPA treatments. Plots were also given the normal twice-over hand weeding. All herbicides were applied in 80–100 gal. spray/ac. The post-emergence MCPA (1·75 lb. a.e./ac.) and pre-emergence monuron (0·7 lb./ac.) treatments were the most effective, but neither was more effective than hand weeding.—P.J.B.

145 Arai, M. and Chisaka, H. **Changes of weed communities by methods of cultivation in winter cropping on drained paddy fields. 2. Influence of harrowing and packing of soil on the quantity of *Alopecurus aequalis* Sobol.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1959, **27**, No. 3, 385–6, bibl. 3, English summary. [Kanto-Tosan Agric. Exp. Sta.]

Emergence of *Alopecurus aequalis* from coarsely-harrowed plots (clod size 1–5 cm) was 60% that from finely harrowed plots (clod size < 1 cm). Soil packing reduced emergence by 20%. It suppressed seedling emergence from the lower layers in finely harrowed, and from the upper layer in coarsely harrowed, plots. F. Eng. s.—D.B.

146 Vámos, R. **" Brusone " disease of rice in Hungary.** *Plant and Soil* 1959, **11**, No. 1, 65–77, bibl. 19, illus. [Inst. Pl. Physiol., Univ. Szeged, Hungary]

Brusone is a physiological disease which causes considerable damage to rice crops in Hungary in years with cool, sunless summers. It occurs on heavy soils with high exchangeable acidity and no $CaCO_3$ in the surface layer. Symptoms of the disease are : death of roots, development of adventitious and sometimes negatively geotropic roots on the stem, brown discoloration visible in transverse sections of the lower part of the stem, some infection with *Piricularia oryzae* and *Helminthosporium oryzae*, and absence of grain. The cause of the disease was considered to be the production of H_2S under reducing conditions in the soil.—R.B.

147 Todd, E. H. and Atkins, J. G. **White tip disease of rice. 2. Seed treatment studies.** *Phytopathology* 1959, **49**, No. 4, 184–8, bibl. 11. [Louisiana Agric. Exp. Sta., Baton Rouge]

White-tip disease is caused by the seed-borne nematode *Aphelenchoides besseyi*. Treatment of soaked infected seed with hot water at 51 and 53°C. killed all nematodes without seriously reducing germination. Treatment of unsoaked seed for 10 or 15 min. with hot water at 55°C., or for 5, 10 or 15 min. at 57, 59 or 61°C., killed all nematodes and had no effect on germination. Fumigation with CH_3 Br was unsatisfactory. Seed treatment with N-244 (3-*p*-chlorophenyl-5-methyl rhodanine) gave good control of white-tip, without phytotoxicity, where experimental samples of the chemical were tested, but commercially-produced samples were ineffective.—R.B.

148 Atkins, J. G. and Todd, E. H. **White tip disease of rice. 3. Yield tests and varietal resistance.** *Phytopathology* 1959, **49**, No. 4, 189–91, bibl. 10. [Crops Res. Div., Agric. Res. Serv., U.S. Dep. Agric., Beaumont, Texas]

The relative resistance of 28 rice varieties to attack by *Aphelenchoides besseyi*, based on the appearance of leaf symptoms, is given.—R.B.

149 Cavalcanti, O. Combate ao percevejo do arroz, *Solubea poecila* (Dallas, 1851). [**The control of *Solubea poecila* on rice (in Brazil).**] *Lavour. arroz.* 1959, **13**, No. 147, 17.

150 Abraham, E. V. **Control of crabs (*Paratelphusa hydrodromus* H) in rice fields.** *Madras agric. J.* 1959, **46**, No. 2, 56–7, bibl. 4. [Agric. Res. Sta., Aduthurai, Madras St., India]

Insecticides have been found to be lethal to crabs, frogs, fish and snakes. Parathion 0·025% spray (as 1 oz. folidol in 12·5 gal. water) was the most successful. Within 72 hours it killed 84% of the crab population. Endrin 0·01% spray and toxaphene 20% dust killed 72 and 71%, respectively.—D.B.

151 Rajagopalan, K. and Pawar, M. S. **Damage to paddy by field rats.** *Rice News Tell.* 1959, **7**, No. 1, 11–12 and 36, bibl. 13. [Agric. Res. Sta., Rudrur, Nizamabad District, India]

Observations were made on susceptibility to rat attack of 400 varieties of rice. Those belonging to the green-leaved, non-scented, white-grained group were more susceptible than the scented or purple-leaved varieties. When plant density increased from 12 in. × 12 in. to 4 in. × 4 in. rat incidence increased from 1–2% to 29–70%.—D.B.

152 Govindaswami, S. and Krishnamurthy, A. **On the occurrence of *O. granulata* in Jeypore tract.** *Rice News Tell.* 1959, **7**, No. 1, 9–10, bibl. 3, illus. [Central Rice Res. Inst., Cuttack, India]

A botanical description is given of a wild perennial species of rice (*Oryza granulata*) which was collected from thick forests in the Jeypore tract of the Karaput District of Orissa, where the climate is warm and humid. These specimens were more robust, and tillered more vigorously than the original specimens of *O. granulata* found in the Western Ghats ; in these respects they resembled *O. meyeriana*, which has not yet been found in India. The absence of a longitudinal row of hairs at the base of the flowering glume indicates that the specimens collected in Jeypore were *O. granulata*. —D.B.

153 Morimoto, I. **On the local difference of ecological characters of rice in Japan.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 193–5, English summary. [Hyogo Univ. Agric.]

154 Alešin, E. P. **Effect of germination conditions on oxidase and catalase of rice.** [Russian] *Fiziol. Rast.* (*Pl. Physiol., USSR*) 1958, **5**, No. 4, 359–60, bibl. 6. [Kuban Expt. Rice Inst., Krasnodar, RSFSR]

155 Baba, I. and Inaba, K. **Physiological studies on the root of crop plants. 1. Some characteristics of rice roots classified as to their age in relation to nutrient-absorption.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 151–4, English summary. [Nat. Inst. Agric. Sci.]

156 Nagai, T. and Hirota, H. **Cultivated rice varieties viewed from root characters. 1. Some ecological characters of rice plants continuously grown in nursery. 2. Root diameter, rooting and others.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 217–20, bibl. 11, illus., English summary. [Kyoto Univ.]

Using 280 cultivars, rice roots were classified into 3 groups on the basis of root diameter and colour. F. Eng. s.—D.B.

157 Kawata, S. and Ishihara, K. **Studies on the root hairs in rice plant.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1959, **27**, No. 3, 341–8, bibl. 11, illus., English summary. [Fac. Agric., Univ. Tokyo]

158 Arikado, H. **Studies on the development of the ventilating system in relation to the tolerance against excess-moisture injury in various crop plants. 10. Effect of removal of the top part of plant on nitrate reduction by the roots.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 215–16, bibl. 8, English summary. [Mie University]

Roots of upland rice plants with their feebly developed ventilating system, had a greater capacity for nitrate reduction (respiration) than had lowland rice plants with their extensive ventilating system. When tops were removed (the supply of oxygen from the upper part of the plant being cut off) the roots of both upland and lowland rice reduced nitrate strongly. Nitrate reduction is regarded as a supplementary respiration process. F. Eng. s.—D.B.

159 Ehrler, W. and Bernstein, L. **Effects of root temperature, mineral nutrition, and salinity on the growth and composition of rice.** *Bot. Gaz.* 1958, **120**, No. 2, 67–74, bibl. 29. [U.S. Salinity Lab., Riverside, California]

Plants of Caloro rice grown in water culture at constant root temperatures of 18° or 30°C. had a greater fresh weight and contained more Mg when grown at the higher temperature. Plants grown to maturity at 30°C. produced more dry matter and more grain, and contained consistently greater quantities of the major cations than did those grown at 18°C. The fresh and dry weights of plants grown in solutions containing 12 m. eq. Ca + Mg + K per l. were significantly greater than those of plants grown with 6 m. eq. cations per l. Grain production was significantly lower at high levels of Ca or Mg than at high levels of K or in isoequivalent nutrient solution. Solutions of NaCl, $CaCl_2$, NaCl/$CaCl_2$ and Na_2SO_4 were added to an isoequivalent

nutrient solution in which rice plants had been growing for 1 month in order to raise the osmotic pressure of the solution from 0·62 atm. to 2 atm. or (NaCl only) at 4 atm. Root temperatures were maintained at 30, 22 and 14°C. until the late flowering stage. NaCl at 4 atm. was lethal at all root temperatures. The dry weight of shoots at late flowering showed a significant positive correlation with root temperature, while that of roots was independent of temperature. Shoots accumulated 30 m. eq. Cl/100 g dry matter where given nutrient solution, and 50–90 m. eq. where given saline solutions containing Cl. Treatments containing sulphate caused 15% less reduction in shoot growth at 30°C. and 20% less at lower temperatures than did treatments containing chloride. Interactions between salinity and root temperature were not significant.—R.B.

160 Zamora, P. M. **Zonal structure of the shoot apex of *Oryza sativa* L.** *Philipp. Agriculturist* 1959, **42**, No. 10, 391–403, bibl. 31, illus. [Cent. Exp. Sta., Univ. Philipp, College, Laguna]

161 Kashibuchi, **Studies on the flowering and ripening of rice plant. 3. On the ripening of kernels in relation to their location on the flower panicle of various heading dates.** *J. Fac. Agric. Iwate* 1959, **4**, No. 2, 152–8, bibl. 5, English summary.

162 Inosaka, M. **Vascular connection of the individual leaves with each other and with the tillers in rice plant.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 191–2, illus., English summary. [Miyazaki Univ.]

163 Sato, T. and Shimizu, K. **Effect of planting densities on the composition of tillers in rice plant.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 179–81, bibl. 7, English summary. [Hyogo Univ. Agric.]

The relationship between planting density and tiller production was studied in 2 types of rice varieties : the panicle-number type e.g. Norin 6 and the panicle-weight type, e.g. Norin 22. F. Eng. s.—D.B.

164 Nagato, K. and Kobayashi, N. **On the development of the tissue of starch-cell in rice kernels.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 204–6, bibl. 12, illus., English summary. [Nagoya Univ.]

The paper describes the development, growth, and dimensions of endosperm cells, leading ultimately to the rice grain with its typical shape and translucence. F. Eng. s.—D.B.

165 Tamai, T. and others. **Fundamental studies of irrigation of upland fields. 5. A newly devised automatic recorder for water absorption rate of upland crops under community conditions, and some results obtained by it. 6. Some water absorption characteristics of paddy rice plants cultivated in upland fields in early season.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 255–60, and 261–5, bibl. 26, illus., English summary. [Coll. Agric., Ehime Univ.]

166 Zsoldos, F. Az árasztás hatása a "különböző nitrogénvegyületek hasznosítására fiatal rizsnövényeknél. **Utilization of various nitrogen sources by young rice plants as affected by irrigation.** *Növénytermelés* 1959, **8**, No. 2, 125–30, bibl. 10, English summary. [Pl. Physiol. Dep., Univ. Szeged, Hungary]

167 Samoto, K. and others. **Studies on the growth of rice plants cultivated in different seasons. 1. Growing progress and changes of chemical composition in rice plant.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1959, **27**, No. 3, 333–6, bibl. 4, English summary. [Tokai-Kinki Nat. Agric. Exp. Sta.]

Compared with the normal time of cultivating rice, early cultivation resulted in shorter plants, more tillers and consequently more panicles per unit area, a greater dry weight of tops at the end of the growing season, and a higher percentage of starch and sugars especially in the early growth stages. Growth and yield were least in late-season cultivation. F. Eng .s.—D.B.

168 Samoto, K. and others. **Some considerations upon the reason of increase of panicles in number, in early season cultivation of paddy rice.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 182–4, bibl. 5, English summary. [Tokai-Kinki Nat. Agric. Exp. Sta.]

Rice varieties were grown early and at the normal time. Compared with normal-season cultivation, plants grown early were shorter ; they produced tillers over a greater range of main-stem nodes (by tiller production from lower nodes) and more panicles per unit area, resulting in higher grain yields. While tillers were shorter, their sugar- and starch-content and the quantity of sugar and of starch per stem were higher than in plants grown at the normal time. A negative correlation between plant height and number of stalks per unit area was found also in plants grown in the cooler regions of Japan, and in out-door compared with glasshouse plants. It was concluded that low temperature was favourable for tillering, number of panicles and grain yield of rice. F. Eng. s.—D.B.

169 Dao, The-Tuan **[Vernalization of rice.]** [Russian] *Agrobiologija* (*Agrobiology, Moscow*) 1959, No. 1, 79–85, bibl. 17. [Democratic Republic of Vietnam]

The work contains a summary in tabular form of results obtained by various authors (in Asia) on rice vernalization. There is evidence that tropical forms of rice react well to pre-sowing vernalization, the types for summer sowings being more sensitive to short day than spring or winter types. Subtropical forms react to vernalization more feebly, the early-ripening types being more sensitive to vernalization and less sensitive to short day than late-ripening types.—M.H.

170 Oka, H. I. **Variations in temperature responses among cultivated rice varieties.** *Phyton* 1959, **12,** No. 1, 1–11, bibl. 9. [Nat. Inst. Genet., Misima, Japan]

In field trials in Formosa over several years, about 160 varieties of rice (*Oryza sativa*) from various Asian countries were sown at 1-month intervals to study their response to temperature as measured by tillering, seedling elongation, duration of the growing period, and culm and panicle length. In addition, germination tests at 6 temperatures, 30°, 23°, 18·1°, 15·8°, 13·8° and 11·7°C., were carried out with seeds of these varieties. It was found that the response to temperature at different developmental stages, or in different organs, can be attributed to two basic responses which are negatively correlated with each other : rate of acceleration of vegetative growth, and rate of advancement of flower initiation, in response to a unit rise in temperature. Varieties belonging to the Indica group generally responded more in rate of acceleration of vegetative growth and less in rate of advancement of flower initiation, than those of the Japonica group. The Indica varieties showed a higher capacity for vegetative growth at high temperatures than the Japonica varieties. It is thought that the low yields of the Indica varieties in tropical countries may be due to their low response to fertilizer.—E.B.O.

171 Zsoldos, F. **Quantitative changes in γ-aminobutyric acid induced by low temperature in rice plants.** *Nature, Lond.* 1959, **184,** No. 4682, 280, bibl. 4, illus. [Inst. Pl. Physiol., Univ. Szeged, Hungary]

172 Bui Gui Dap and Ngiem fu Šuan. **[The photophase in some Vietnam varieties of rice.]** [Russian] *Agrobiologija* (*Agrobiology, Moscow*) 1959, No. 2 (116), 220–30. [Agric. Inst., Hanoi]

A study of the light phase in 3 varieties of *Oryza sativa* typical for northern Vietnam has shown : (1) the variety Nam Nink and the majority of spring rice types with a short developmental period are not sensitive to light conditions, since they flower in short day as well as in continuous day ; (2) the 10- and 5-month varieties (Tam Den and Chiem Chanh) with a longer developmental period, require short day for normal development. The former develops in spring and summer under high temperature and its photophase begins on the 20th or 23rd day after sowing, while the latter develops first in low winter temperatures and subsequently in the higher temperatures of spring and early summer, its photophase starting late, on the 90th or 100th day after sowing. In winter temperatures below 20°C. Chiem Chanh does not progress to the photophase (even under short days) until the onset of high spring temperatures. In northern Vietnam when rice is grown on one area more than once a year, it is better to use the spring type, with a short development period. In view of the unfavourable conditions in which 5-month rice develops, it is recommended that its use be limited and that sowings of the spring and 10-month types should be extended.—M.H.

173 Yamada, N. and Ōta, Y. **Study on the respiration of crop plants. 8. Effect of hydrogen-sulfide and lower fatty acids on the respiration of root in rice plant.** *Proc. Crop Sci. Soc. Japan* 1958, **27,** No. 2, 155–60, bibl. 14, Japanese summary. [Nat. Inst. Agric. Sci.]

174 Shimoyama, T. **Studies on the wind- or storm-damages to paddy rice plant in the stages before and after heading. 8-10. On the physio-nutritional disturbance of wind-damaged rice plant.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27,** No. 2, 163–7, bibl. 21, illus., English summary. [Okayama Univ.]

These were pot experiments. They showed that reduction in fertility of rice as a result of wind damage was not attributable to direct injury but to physiological disturbances which caused nutritional deficiencies. F. Eng. s.—D.B.

175 Tsuboi, Y. and Hitaka, N. **Studies on the wind damage of rice plant. On the causes of the occurrence of sterile flowers.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27,** No. 2, 207–9, bibl. 8, illus., English summary. [Nat. Inst. Agric. Sci.]

Many rice plants subjected to strong wind in a wind tunnel had sterile flowers. Most of these bloomed on the day of treatment. The sterility was caused by absence of pollination. The view is put forward that flower opening is hastened by wind but that anther dehiscence does not keep pace.—F. Eng. s.—D.B.

176 Seko, H. and others. **Lodging of rice plant in relation to several different cultural conditions. 2.** [Japanese] *Proc. Crop. Sci. Soc. Japan* 1958, **27,** No. 2, 173–6, bibl. 12, English summary. [Kyushu Agric. Exp. Sta. and Tokai-Kinki Agric. Exp. Sta.]

Experiments showed that deep-water irrigation or drainage [respectively] decreased or increased resistance to lodging in rice if certain internodes (N_4 and N_3) were undergoing elongation at the time of treatment, as in Norin 8. The production of aerenchyma or mechanical tissue of the internodes was strongly influenced by deep-water irrigation or drainage [respectively]. F. Eng. s.—D.B.

177 Hasegawa, G. and Oba, T. **Studies on leaf analysis. 6. Critical leaf concentrations indicating N, P and K deficiencies of rice plants. 7. N-P-K equilibrium in leaves and culms of rice plants.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 185–90, bibl. 9, English summary. [Hyogo Univ. Agric.]

178 Tanaka, A. and others. **Studies on the nutrition of rice plant (*Oryza sativa* L.). 5. Comparative effect of ammonium- and nitrate-nitrogen on growth, yield and nitrogen uptake by rice plant.** *Proc. Indian Acad. Sci.* Sect. B. 1959, **49**, No. 6, 386–96, bibl. 16, illus. [Central Rice Res. Inst., Cuttack]

Rice-variety Ptb 10, was grown under solution-culture technique with 2 levels of N (20 and 100 ppm) each as nitrate and as ammonium salt. With N at 20 ppm, its source did not influence yields of grain or straw, but with N at 100 ppm, the nitrate source gave better results. NH_4-N given at an early stage promoted tillering. NO_3-N promoted the uptake of Ca, Mg, Mn, K and P_2O_5. The best results were obtained by supplying, at 100 ppm, N as NH_4 in the vegetative stage and as NO_3 during the elongation and reproductive stage.—D.B.

179 Deguchi, M. and others. **Re-examination of the effect of liming on paddy rice. 2. Influence of liming on hardness of grain and tenacity of stem.** *Soil and Pl. Fd* 1958, **4**, No. 2, 53–6, bibl. 5. [Tokyo Educ. Univ., Japan]

Lime, when applied at panicle initiation, increased the protein content and hardness of grains ; but when applied later, before heading, the content of CaO, reducing sugar, and non-protein N increased. Liming increased stem tenacity. This was positively correlated with CaO content, cellulose content and stem diameter and negatively correlated with SiO_2 and ash content.—D.B.

180 Sone, K. **Studies on the quality of the plant food. 2. Influence of variety and environment upon the riboflavin content of hulled rice in special reference to its effective factors.** *Tohoku J. agric. Res.* 1959, **9**, No. 3, 179–97, bibl. 30. [Tohoku Univ., Sendai, Japan]

The influence of variety and of weather on the riboflavin content of hulled rice was more clearly evident when rice was grown on peaty soil than on clay-loam soils. Fungicides, but not fertilizers, influenced the riboflavin content of hulled rice almost as much as did the variety of the rice. F. s.—D.B.

181 Ōta, Y. and others. **Studies on ripening of rice. 2. Effect of shading treatment on the ripening.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 196–200, bibl. 5, English summary. [Nat. Inst. Agric. Sci., and Saitama Agric. Statistic and Survey Office]

The paper deals with the effect of light intensity and N supply on the number of spikelets, seed-setting rate and starch content of the straw when grains are ripe ; this last item is a measure of surplus N. N applied to rice as a top dressing at heading is wasted because it accumulates in the straw. Shading inhibits absorption of P (but not N or K) and its translocation from straw to ears. It also reduces rate of seed setting and the grain weight. F. Eng. s.—D.B.

182 Shimizu, T. and Tsuno, Y. **Studies on yield-forecast in main crops. 4. On the relation between the light intensity and the dry matter production of rice plant.** *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 168–70, bibl. 2, English summary. [Hyogo Agric. Statistic and Survey Office]

183 Katayama, Y. and others. **Studies on the contamination and the variation of crop plants caused by radioactivity. 1. Contaminations of paddy soils and rice plants in the southern region of Kyushu.** [Japanese] *Bull. Fac. Agric. Miyazaki* 1959, **4**, No. 2, 256–60, bibl. 7, illus., English summary.

Paddy soils and rice plants were sampled in autumn 1958 from 10 localities in the extreme south of Japan and tested for contamination with radioactive elements. The quantity of fission products found in rice plants differed from sample to sample. It is suggested that the quantity present varies with the growth stage of rice at the time of contamination. Fission products accumulated in leaves and stems rather than in the grains of the rice plants. F. Eng. s.—D.B.

184 Tanaka, A. and others. **Studies on the nutrition of rice plant (*Oryza sativa* L.). 3. Partial efficiency of nitrogen absorbed by rice plant at different stages of growth in relation to yield of rice (*O. sativa* var. *indica*).** *Proc. Indian Acad. Sci.* Sect. B. 1959, **49**, No. 4, 207–16, bibl. 9. [Central Rice Res. Inst., Cuttack]

Partial efficiency of N is defined as the increase in yield of grain or straw for unit increase in N absorbed by the plant. In these experiments,

partial efficiency for grain yield is considered. When grown at low levels of N (10 ppm), *O. sativa* var. *indica* had 2 peak periods of partial N efficiency for grain production : (1) tillering stage, determining tiller number and panicle number ; and (2) flowering time between boot- and milk-stage, influencing grain weight per panicle. When grown at high levels of N (60 ppm), there was one peak period of partial efficiency. This was the tillering stage, by which time (at this level of N) sufficient N was stored in the vegetative parts to supply the needs of the reproductive organs later on. Further N supplies reduced grain yield and made the plant susceptible to disease. From these water culture experiments it appears that, for *indica* rice, under field conditions, N should be given in split applications, the first as basal manuring or at an early stage of vegetative growth and the second as a top dressing at the reproductive stage. [See also *Fld Crop Abstr.* 11 : 1515; 12 : 132 and 185.]—D.B.

185 TANAKA, A. and others. **Studies on the nutrition of rice plant (*Oryza sativa* L.). 4. Growth and nitrogen uptake of rice varieties (*O. sativa* var. *indica*) of different durations.** *Proc. Indian Acad. Sci.* Sect. B. 1959, **49**, No. 4, 217–26, bibl. 9. [Central Rice Res. Inst., Cuttack]

In field experiments, the N content of early, medium, and late varieties of *O. sativa* var. *indica* was determined at different growth stages and the results were used to find the best stages for manuring. In all varieties, maximum N intake occurred during maximum tiller production and ear development. Split applications of N fertilizer, one at planting and the second at ear initiation, should increase grain yield, especially in the medium and late varieties.—D.B.

186 PIACCO, R. L'urea in risaia. [**Urea in rice-fields.**] *Progresso agric.* 1959, **5**, No. 5, 554–7.

For rice crops yielding 5000–7000 kg/ha, the amount of N applied in Italy is about 100–120 kg/ha. From results in Italy and other countries (the literature is reviewed) it is concluded that urea is satisfactory as a source of N for rice.—E.B.O.

187 KIDO, M. and others. **Physiological and ecological studies of rice plant in well-drained and ill-drained field. 4. Differences in quality and ripening of rice grains as affected by fertilizers.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 161–2, bibl. 3, English summary [Niigata Univ.]

In field experiments, the effect was studied of calcium silicate on starch quality, amylase activity, and inorganic nutrient content of rice. The 1000-grain weight, a useful index of ripening, increased with the application of calcium silicate to the soils of both poorly drained and well drained soils. F. Eng. s.—D.B.

188 STAKER, E. V. **Green manure crops in relation to paddy rice production in southeast Asia.** *Internat. Rice Comm. News Lett.* 1958, **7**, No. 4, 1–20, bibl. 12.

A summary is given of results from investigations with green manure crops for increasing rice yields in south-east Asia. Green manures are important in India, Indonesia and Taiwan, but in Burma, Thailand, the Philippines and Cambodia, they are not generally used. For the region as a whole, green manures which have been tried successfully include species of *Sesbania* and *Crotalaria*, as well as peas, soyabean, mung and radish. In India, leaves from forest trees and shrubs mixed with soil were about as effective as green manures grown *in situ*. In a trial in Taiwan, the amount of N fixed by legumes varied from 26 kg/ha for the blue soyabean to 92 kg/ha for *Sesbania* sp. In trials in India green manuring increased rice yields from 2 to 114%. In Java, *Crotalaria juncea*, grown each year before rice for 10 years, increased rice yields by an average of 19% above those from unmanured plots. In Ceylon, 6 tons of green manure per ha were more effective in raising rice yields than 10 tons of either f.y.m. or compost.—E.B.O.

189 GONÇALVES, P. A. Influência da umidade do ar na percentagem de umidade no grão armazenado. [**Influence of air humidity on the percentage of moisture in stored grain.**] *Lavour. arroz.* 1959, **13**, No. 147, 11–14. [Inst. Rio Grandense do Arroz, Brazil]

Data are given of the percentage of moisture in unhusked grain of the rice variety Zenith, determined during 9 July–20 Oct. 1958, and of the corresponding air relative humidity, temperature and atmospheric pressure in the warehouse.—E.B.O.

190 FERNANDO, H. E. **Storage loss of paddy due to *Sitotroga cerealella* and its control.** *Internat. Rice Comm. News Lett.* 1959, **8**, No. 1, 20–5, bibl. 5. [Dep. Agric., Peradeniya, Ceylon]

It is recommended that rice for sowing be treated before storage with 0·4% malathion dust at 2·25 oz./bu. To protect rice for consumption, the bags in the store should be sprayed monthly with 2 fluid oz. of 50% malathion emulsifiable concentrate in 1 gal. of water.—E.B.O.

191 CHANG, H. S. **Rice seed multiplication and distribution in Taiwan.** *Internat. Rice Comm. News Lett.* 1958, **7**, No. 4, 21–6.

Improvements in the system of rice seed multiplication and distribution in Taiwan include: adequate supervision of seed multiplication ; a reduction in the number of seed farms from 7000 to 3000 ; the establishment of a unified system for approving new varieties and of a system for seed certification.—E.B.O.

TEOSINTE

192 Melhus, I. E. and Ahrens, J. F. **The effect of photoperiod on the growth and development of teosinte** (*Euchlaena mexicana* **Schrad**). *Ceiba* 1959, **8**, No. 1, 1–16, bibl. 14, illus. [Iowa State Coll., Ames]

Photoperiods of 10 hr. for 5–20 days induced flowering and seed maturation in one variety of teosinte from Florida, 97–51, 2 from Mexico, 65–51 and 406–51 and one from Guatemala, 35–51, during the growing season at Ames, Iowa (42°N. lat.) in 1956–7. The control plants exposed to prevailing long-days grew 12–15 ft. tall, flowered in Sept. but failed to mature seed before being killed by frost. When plants were started in the glasshouse and transplanted in the field, the vegetative growth was dwarfed and the time to anthesis and ripe seed was rapid, 44–47 and 80–90 days, respectively. When the plants were grown in the field and exposed to photoinduction periods of 10 hr. for 10, 15 and 20 days, flowering occurred in 50–80 days in the varieties 406–51 and 65–51 and in 67–91 days in the variety 35–51. The time to flowering and ripe seed was most rapid where the plants were treated for 20 days. The photoperiodic response was stronger in 35—51 and 97–51 than in 65–51 and 406–51. F. s.—e.b.o.

GENERAL

See also Abs. 513.

193 Dutch Information Centre for Agricultural Seeds, Netherlands. Supplementary seed bulletin. 1958. **Spring-sown cereals.** pp. 7.

Data presented include summaries of varietal characteristics and performance.—g.m.r.

194 Dutch Information Centre for Agricultural Seeds, Netherlands. Supplementary seed bulletin. 1958. **Winter-sown cereals.** pp. 6.

Summarized data on varietal characteristics and performance are given.—g.m.r.

195 Ingold, M. and Zweifel, J. Les céréales cultivées en Suisse romande. [**Cereals grown in French Switzerland.**] *Rev. rom. Agric.* 1959, **15**, No. 8–9, 69–80, bibl. 46, illus. [Stat. Féd. Essais Agric., Lausanne]

This review gives the present list of varieties selected for Switzerland, sources of seed supply, and comparative descriptions of varieties of the following : oats, maize, spelt wheat, spring- and winter-wheat, oats and barley.—d.b.

196 Department of Agriculture and Marketing, Nova Scotia, Canada. **Co-operative variety trials.** *Rep. Dep. Agric. Mktg Nova Scotia, 1958*, p. 25.

Cereal varieties recommended for Nova Scotia are : oats : Abegweit, Scotian, Simcoe, Fundy and Ajax ; barley : Brant, Montcalm, Herta and Charlottetown No. 80.—r.b.

197 Rijkslandbouwhogeschool Gent. Wintergranen. [**(Weed control in) winter cereals.**] *Versl. Centr. Onkruidonderz. 1958* [n.d.], 3–4.

DNC applied at 4–5 kg/ha when winter wheat was at the 3 to 5-leaf stage gave much better weed control than hoeing ; where *Matricaria chamomilla* and *Stellaria media* were the principal weeds, dilution with 100 l. water/ha gave satisfactory results. Spraying in early spring did not give such good results. DNC at 4 kg/ha applied to late-sown winter wheat at the 3·5 to 4-leaf stage gave excellent control of *M. chamomilla*, *S. media*, *Veronica* spp., *Geranium molle* and *Capsella bursa-pastoris* when applied at a volume of 100 or 1000 l./ha. The herbicidal action of the ammonium salt of DNC was no different from that of pure DNC and wheat yields were not appreciably depressed by either. Calcium cyanamide gave better control of *Apera spica-venti* in winter wheat when applied as dusts ; where 200 kg/ha or less were applied, coarse dusts gave less efficient control. CMPA at 1 kg/ha controlled well-developed *M. chamomilla* in winter wheat only where 700 gNa DNC, 500 g NH_4, DNC or 100 g NH_4 dinoseb were added ; MCPA and 2,3,6-TBA in 2 : 1 ratio gave better control, but TBA at 280 g/ha, applied when the crop was 45 cm high, reduced the yield of straw and to some extent that of grain. MCPA diethanolamine ester at 2 kg/ha caused growth distortion in 27 barley, rye, spelt and wheat varieties when applied early. MCPB butyl ester at 2 kg/ha applied at early tillering caused serious damage to rye and also damaged spelt and wheat, but barley was little affected. MCPP diethylamine ester at 2 kg/ha gave excellent control of *Stellaria media* and caused slight leaf-curl in wheat, but did not affect barley or rye. Capelle Desprez was more resistant to phenoxyaliphatic herbicides than other winter-wheat varieties.—r.b.

198 Rijkslandbouwhogeschool Gent. Zomergranen. [**(Weed control in) spring cereals.**] *Versl. Centr. Onkruidonderz. 1958.* [n.d.], 4–5.

TCA at 40 kg/ha was an effective as dalapon at 20 kg/ha for killing *Agropyron repens* rhizomes. Barley sown 3·5 months later was adversely affected, especially where TCA had been used, while red clover sown at the same time was affected by dalapon, but not by TCA. MCPA at 560 g/ha + TBA at 280 g/ha was very effective against *Lamium purpureum*, *Polygonum* [*aviculare*] and well-developed *Matricaria chamomilla* when applied to spring cereals containing these weeds. TBA in

excess of 200 g/ha tended to reduce the height of the crop, especially in the case of barley.—R.B.

199 Stovell, F. R. **CMPP for cereal weed control.** *Span*, 1959. **2**, No. 2, 71–3, bibl. 4. illus.

200 Machacek, J. E. **Co-operative seed treatment trials—1958.** *Pl. Dis. Rptr* 1959, **43**, No. 3, 343–7.

In plot trials in the USA and Canada, 19 new, or comparatively new, seed dressings were tested against bunt of wheat (*Tilletia foetida* and *T. caries*), smut of oats (*Ustilago avenae* and *U. kolleri*), covered smut of barley (*U. hordei*), and seed rot of flax resulting from threshing injury. Results showed that all but one of the seed dressings gave good control of wheat bunt, but not of oat smut, and that the control of barley smut and flax seed rot was variable. All the liquid dressings depressed the germination percentage of oats tested after 4 months storage, in some instances very severely. Such injury occurred in wheat seed in 2 instances only, and did not occur in barley and flax seed.—E.B.O.

201 Coïc, Y. and Coppenet, M. Sur la carence en manganèse des céréales dans les sols humifères de Bretagne. [**Mn defiency of cereals in the humus soils of Brittany.**] *Ann. agron., Paris* 1958, **9**, Suppl. 2, 111–38, bibl. 9, illus. [Sta. Cent. Physiol. Vég., Versailles, France]

202 Bowden, W. M. **The taxonomy and nomenclature of the wheats, barleys and ryes and their wild relatives.** *Canad. J. Bot.* 1959, **37**, No. 4, 657–84, bibl. 43. [Bot. Pl. Path Div., Can. Dep. Agric., Ottawa, Ontario]

Wheat, barley and rye are here considered to belong to the tribe Triticeae Dumortier. The genus *Triticum* is expanded to contain *Aegilops*. Cultivated wheats belong to *Triticum turgidum* and *T.* × *aestivum*, cultivated barleys to *Hordeum vulgare*, and cultivated ryes to *Secale cereale*.—R.B.

203 Scheibe, A. and Meyer zu Drewer, H. Vergleichende Untersuchungen zur Atmungsintensität der Wurzeln unterschiedlicher Genotypen bei Getreidearten. [**A comparative examination of the rate of respiration of roots of different genotypes in cereal species.**] *Z. Acker- u. PflBau* 1959, **108**, No. 1/2, 223–52, bibl. 23, illus., English summary. [Inst. PflBau u. PflZücht., Univ. Göttingen, W. Germany]

By a gas-analysis method (described) the rate of CO_2 respired from roots of whole plants of spring cereals (wheat, oats, barley and rye) was determined at 5 growth stages from the 3–4 leaf stage to the milk-ripe stage. In all cereals examined, the intensity of root respiration decreased continuously from the early to the late stage of development and was, in general, higher in early-maturing than in late-maturing varieties. The energy liberated in the early stages of development is a decisive factor in determining subsequent crop yields.—D.B.

204 Girfanov, V. K. and Biglov, T. T. [**Phasic development, winterhardiness and productivity of winter cereals.**] [Russian] *Agrobiologija* (*Agrobiology, Moscow*) 1959, No. 1, 107–10, bibl. 15. [Biol. Inst., Baškir Filial Acad. Sci., Ufa]

205 Pugnat, C. and Stroun, M. Étude sur la résistance au froid des blés. [**Studies on cold resistance in cereals.**] *Landw. Jahrb. Schweiz* 1958, **72**, 417–23, bibl. 28, illus., English, German and Italian summaries. [Stat. Fédérales d'Essais Agric., Lausanne ; and Univ. Genève]

The relationship between photoperiodism and cold resistance in cereals was demonstrated in 2 experiments, using varieties of wheat and barley under different periods of illumination.—D.B.

206 Sugahara, T. and others. **Influence of the various parts of the photosynthetic organs of wheat and barley in producing grains during the ripening period. 2.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1959, **27**, No. 3, 391–2, bibl. 5, English summary. [Mie Agric. Statistics and Survey Office]

The percentage contributions to the grain yield, of the photosynthetic products from leaf blade, stem, ear, and reserve materials, respectively, were : in wheat 37, 31, 21 and 12 ; and in barley, 27, 42, 23 and 9. F. Eng. s.—D.B.

207 Pinthus, M. J. **Observations on the phenology of spring wheat, barley and oats.** *Bull. Res. Coun. Israel* (*D*) 1959, **7D**, No. 2, 71–80, bibl. 10. [Fac. Agric., Hebrew Univ., Rehovot, Israel]

Observations were carried out on jointing and heading of these crops when sown on 7 successive dates from end-Nov. to mid-June. The number of days from emergence to jointing and from jointing to heading were correlated with temperature and daylength prevailing at these periods. The genotypic differences between early and late varieties regarding jointing and heading dates were estimated by the differences between the multiple regression equations of these varieties. F. s.—M.H.

208† Buelow, F. H. **Air-flow measurement in crop driers.** *Agric. Engng, St. Joseph, Mich.* 1959, **40**, No. 4, 218, bibl. 1, illus.

The apparatus described consists of a transparent plastic pipe 40 in. long and 4·5 in. in diameter, down which an inflated toy balloon is

allowed to fall. The difference between the rate of fall of the balloon when the pipe is placed on the surface of grain or hay in a crop drier and the rate of fall when placed on a solid surface, gives a direct measure of the rate of air flow through the crop.—R.B.

LEGUMES

COWPEAS

209 Busson, F. and others. Étude de la fraction protidique des graines de *Vigna unguiculata* Walp. [**Study of the protein fraction in seeds of cowpeas.**] *Qual. Plant. et Materiae veg.* 1959, **6**, No. 1, 11–15, bibl. 11. [Lab. Rech. Serv. Santé France d'Outre-Mer, Marseille]

210 Njoku, E. **The photoperiodic response of some Nigerian plants.** *J. W. Afr. Sci. Ass.* 1958, **4**, No. 2, 99–111, bibl. 11, illus. [Univ. Coll., Ibadan, Nigeria]

In investigations on the photoperiodism of a range of Nigerian plants, cowpeas [*Vigna sinensis*] were shown to have a minimum critical day length of 12·5 hr. In the latitude of Ibadan, where the time between sunrise and sunset varies from 11 hr. 40 min. in Dec. to 12 hr. 33 min. in June, flowering did not begin until Sept. F. s.—S.M.J.

SOYABEANS

See also Abs. 397, 431, 450, 457, 488, 490.

211 Dutta, P. K. **The effect of previous crops on growth, yield, and certain chemical constituents of two soybean varieties.** *Diss. Abstr.* 1959, **19**, No. 11, 2707–8. [Univ. Minnesota, Minneapolis 14]

Trials were carried out in Minnesota during 1956–7 to determine the effect on soyabeans of oats, wheat, maize, flax and soyabeans as preceding crops. There were no marked differences between them in terms of their effect on yields of seed and hay, content of protein and oil in the seed, date of flowering, pod numbers, leaf area, plant height and root weight. The trials were carried out on soil of high fertility.—P.J.B.

212 Frans, R. E. **Effect on soybeans of herbicide and narrow row width combinations.** *Rep. 84 Ark. Agric. Exp. Sta.* 1959, pp. 20, bibl. 3 in text, illus.

Results of experiments with soyabeans grown at 4 locations in Arkansas at row-spacings varying from 7 to 42 in. indicated that yields equal to or greater than those where the conventional 36–42 in. spacing was used, could be obtained by using narrower row-spacings, except on soils with a relatively shallow clay-pan. Under dry conditions, soyabeans grown in closely-spaced rows gave the highest yields, whether or not weeds were present. Plant competition was severe in soyabeans grown at intermediate row-spacings where no weed control measures were applied. At one location, highest yields were obtained at 7-in. row-spacings where 7·5 lb. CIPC/ac. was applied at sowing. Where heavy rainfall occurred shortly after sowing CIPC applied at sowing caused considerable phytotoxicity. Early post-emergence applications of dinoseb alkanolamine ester at 2·5 lb./ac. gave good weed control without damaging the crop.—R.B.

213 Urano, K. and others. **Effect of soil moisture content at various growing periods on growth and yield of soybean. 2. Changes of nitrogen and carbohydrates in soybean plant as affected by abundant and deficient soil moisture content.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 315–18, bibl. 6, English summary.

214 Canterbury Agricultural College, Lincoln, N.Z. **Soya bean trials.** *Annu. Rev. Canterbury (N.Z.) agric. Coll.* 1959, 70–2.

Twenty years ago this crop was not recommended for growing in New Zealand (*Herb. Abstr.* 9 : 1443), but because new varieties have been developed for N. Zealand latitudes, trials are again in progress. Seed of 9 varieties was obtained from Iowa and Minnesota, USA. Under dry conditions and relatively low fertility of the soil, yields obtained ranged from 21·6 to 35·7 bu./ac. Further studies are planned, with special regard to inoculation with Rhizobia.—M.H.

215 Forage Notes. **Merit soybean.** *Forage Notes* 1959, **5**, No. 1, 38–9.

The soyabean variety Merit, a cross between Blackhawk and Capital, matures 2–3 days earlier than Comet and 5–6 days earlier than Capital. It is an erect bushy plant, 30–36 in. tall, which is well adapted for some regions in Ontario and S.W. Quebec. The oil content of the seeds is higher than that of any variety of similar earliness.—R.B.

216 Pearse, F. S. **Low cost weed control in soybeans.** *Down to Earth* 1959, **14**, No. 4, 7–8, bibl. 4, illus. [Dow Chemical of Canada Ltd., Sarnia, Ontario]

Soyabeans sown on 21 May 1958 were treated with 1, 2 or 3 lb. dinoseb/ac. just before emergence or 1 – 8 days later to control *Ambrosia artemisiifolia* and *Setaria viridis*. All post-emergence treatments of 2 or 3 lb./ac. controlled the former weed. Satisfactory control of the latter was achieved with 3 lb. dinoseb/ac. applied 3 days after soyabean emergence, and with 2 lb./ac. applied 4 days after emergence. Delayed treatment resulted in higher soyabean yields. There was a close correlation

between soyabean yields and the degree of control of *S. viridis*. Soyabeans sown in late June and treated when the temperature exceeded 85°F. showed extensive herbicidal damage.—R.B.

217 Sutherland, M. L. and McLane, S. R. **The use of substituted chlorobenzoic acids for weed control in soybeans.** *Proc. 15th N. Cent. Weed Contr. Conf.* [USA] 1958, 12. [Amchem Products, Inc., Ambler, Pennsylvania]

In trials in Pennsylvania, pre-emergence applications of dinoben (3-nitro-2,5-dichlorobenzoic acid) and amoben (3-amino-2,5-dichlorobenzoic acid) at 4 and 8 lb./ac. were made to soyabeans. Plots treated with 4 lb. dinoben remained free from annual weeds for at least 2 months, while the residual effect of amoben persisted for several weeks longer than that of dinoben. The results of further limited trials indicated that amoben was more effective than dinoben, was more persistent in its effect on weeds and caused no injury to soyabeans. Amoben at 8 lb./ac. resulted in the complete control of a range of weeds, including *Setaria* spp., *Echinochloa crus-galli*, *Sorghum halepense*, *Agropyron repens*, *Stellaria media*, *Amaranthus retroflexus*, *Chenopodium album* and *Rumex* spp.—P.J.B.

218 Key, J. L. and Hanson, J. B. **Effect of 2,4-D treatment on the respiratory metabolism of etiolated soybean seedlings.** *Proc. 15th N. Cent. Weed Contr. Conf.* [USA] 1958, 3–4. [Univ. Illinois, Urbana]

219 Ivanovskaja, T. L. [**Formation of nodules on soyabean roots in culture tests.**] [Russian] *Agrobiologija* (*Agrobiology, Moscow*) 1959, No. 1, 23–36, bibl. 14, illus.

220 Howell, R. W. and Cartter, J. L. **Physiological factors affecting composition of soyabeans : 2. Response of oil and other constituents of soyabeans to temperature under controlled conditions.** *Agron. J.* 1958, **50,** No. 11, 664–7, bibl. 16. [U.S. Regional Soybean Lab., Urbana, Ill.]

Soyabean seed produced by plants grown in glasshouses at temperatures of 85, 77 and 70°F. contained 23·2%, 20·8% and 19·5% oil, respectively, during the pod-filling stage. Changes caused by temperature differences occurred mainly in the triglyceride components of the oil. A number of plants were grown at day temperatures of 70°F., except for one week, either 2, 3, 4, 5, 6 or 7 weeks before maturity, when day temperatures of 85°F. were applied. Plants receiving high temperatures between 4 and 7 weeks before maturity produced seed containing 22% oil, while those receiving high temperatures 2 weeks before maturity produced seed containing 19·6% oil. Increases in temperature increased plant height, number of nodes and stem weight, while the content of protein and that of non-protein N in the seed, number of pods, seed yield, number of seed produced and weight per 100 seeds were not increased. F .s.—R.B.

221 Ueki, K. and Igawa, M. **The influence of high night temperature on the growth and fruiting in soy-bean.** [Japanese] *Tech. Bull. Fac. Agric., Kagawa* 1958, **9,** No. 3, 111–18, bibl. 20, English summary.

Before flowering of soyabean, high night-temperature delayed flowering, increased the number of flowers and increased the duration of both flowering and fruiting periods ; but early and late varieties were influenced to a different degree. Percentage pod-setting decreased, especially in early varieties. After flowering, high night-temperature extended the fruiting period and decreased the rate of pod-setting, especially in late varieties. F. Eng. s.—D.B.

222† Sapin, P. Le soja dans le monde. [**Soyabeans in the world.**] *Bull. agric. Congo belge* 1959, **50,** No. 4, 897–948, bibl. 39, illus., Flemish summary. [Div. Pl. Vivr. INÉAC, Yangambi, Belgian Congo]

This study on the adaptation of the soyabean to regions having different climatic and photoperiodic conditions is based mainly on investigations and observations made in the USA, in Algeria and at Yangambi. Comparison is made between the climate in central Manchuria, where soyabeans have been grown for a long time and where they may have originated, and that at Yangambi, near the Equator, where they show good adaptation. Among the aspects considered are : photoperiodic and thermic characteristics of the soyabean ; classification of soyabeans into climatic types ; cultural methods ; characteristics and uses of the seed and the fodder. A list is given of soyabean varieties introduced into Yangambi, together with their countries of origin.—E.B.O.

GROUNDNUTS

See also Abs. 488.

223 Kajjari, N. B. and others. **Optimum spacing and economic seedrate for groundnut crop in the arid zone of northern Karnatak.** *Mysore agric. J.* 1958, **33,** 154–9, bibl. 3. [Agric. Res. Sta., Bijapur and Annigeri, Mysore, India]

Yields of Spanish Improved (early, erect) and Pondichery 8 (late, spreading) were determined when sowing rates of 80, 100 and 120 lb./ac. were combined with row spacings of 12, 15 and 18 in. for Spanish Improved and 12, 18 and 24 in. for Pondicherry 8. In the case of Spanish Improved, the best combination at Bijapur (centre of the arid zone) was 100 lb. seed/ac. sown in rows 15 in. apart, and at Annigeri (in the arid part of the

transition tract of Dharwar District) 120 lb./ac. in rows 12 in. apart. For Pondicherry 8 at Bijapur, 80 lb. seed/ac. sown in rows 12 in. apart is recommended.—D.B.

224 Fukui, J. and others. **The influence of soil heaping at the lower part of stem upon bud-, flower- and pod-shedding in soybean.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1959, **27**, No. 3, 377–8, bibl. 7, English summary. [Kanto-Tosan Agric. Exp. Sta.]

Heaping soil round the lower parts of the stems of soyabean plants (see *Fld Crop Abstr.* 11 : 1549) reduced the shedding of buds, flowers and pods, and the peak period of such shedding was delayed. Seed yields were highest when the soil was heaped 3 times. F. Eng. s.—D.B.

225 Dewez, J. La culture de l'arachide dans la plaine de la Ruzizi. [**Groundnut-growing in the Ruzizi plain (Belgian Congo).**] *Bull. Inform. INÉAC* 1959, **8**, No. 4, 219–30. [Sta. d'Essais de Lubarika]

In the Ruzizi plain, the development of groundnut-growing is dependent on irrigation. The main results from trials with groundnuts to study spacing, sowing depth, varieties and irrigation were : (a) the best spacing was 40 cm between rows, 2 seeds being sown in pockets 10 cm apart, or one seed at 5 cm apart in the row ; (b) sowing at a depth of 6–8 cm resulted in best emergence ; (c) A.1055 was the best variety ; (d) the irrigation system proposed is : 5 irrigations of 300 m^3 each during the 1st month, 3 of 500 m^3 each during the 2nd month and 5 of 500 m^3 each during the 3rd month.—E.B.O.

226 Prevot, P. and Ollagnier, M. Épuisement du sol et effet des fumures dans un assolement continu arachide-mil. [**Soil exhaustion and the effect of fertilizers in a continuous groundnut/millet rotation.**] *Oléagineux* 1959, **14**, No. 7, 423–31, bibl. 8.

Three series of plot trials are being carried out at Darou, Tivaouane and Louga, Senegal, to study the yields obtained in a continuous groundnut/millet [*Pennisetum* sp. or *Sorghum* sp.] rotation. Soil and rainfall vary greatly in the 3 localities. It has been found that continuous cropping results in decreasing yields but that the application of a complete chemical fertilizer counteracts this effect. At Darou, where rainfall is higher than in the other localities, being 600–1200 mm per annum, after 7 years of continuous cropping, groundnut yields (whole pods) from the manured plots were 2 metric tons per ha, which were similar to those obtained in the first year without fertilizer.—E.B.O.

227 Arthur, B. W. and Hyche, L. L. **Soil applications of insecticides for control of tobacco thrips on peanuts.** *J. econ. Ent.* 1959, **52**, No. 3, 451–2, bibl. 7. [Alabama Polytech. Inst. Agric. Exp. Sta., Auburn]

Aldrin or dieldrin at 2 lb./ac., thimet at 1, 2·5 or 5 lb./ac., and di-syston (Bayer 19639) at 2·5 lb./ac., effectively reduced populations of *Frankliniella fusca* on groundnuts, but yields were not significantly increased.—R.B.

228 Cunningham, W. H. and others. **Insecticidal control of the lesser cornstalk borer on peanuts.** *J. econ. Ent.* 1959, **52**, No. 2, 329–30. [Texas Agric. Exp. Sta., College Station]

Groundnut plants were sprayed with endrin at 0·4 lb./ac., alone, or mixed with DDT at 1·5 lb./ac. to control *Elasmopalpus lignosellus*. Damage was significantly reduced by all treatments, but yields were significantly increased only where endrin was applied alone.—R.B.

229 Arthur, B. W. and others. **Control of the red-necked peanutworm on peanuts.** *J. econ. Ent.* 1959, **52**, No. 3, 468–70, bibl. 4. [Alabama Polytech. Inst. Agric. Exp. Sta. Auburn]

Infestations of *Stegasta basqueella* on groundnuts were effectively controlled by 3 or 4 applications of 10% DDT, 20% toxaphene, 2% endrin, 2% dieldrin or 5% guthion as dusts at 20–25 lb./ac. per application. The treatments had no significant effect on groundnut yields. F. s.—R.B.

230 Teter, N. C. and Miller, L. I. **Abnormality of peanut seedlings caused by seed injury.** *Pl. Dis. Rptr* 1949, **43**, No. 3, 353–9, bibl. 9, illus. [Virginia Agric. Exp. Sta.]

Injury to the radicle tip of the seed and the orientation of groundnut seed sown in soil have been shown to influence hypocotyl curvature, rate of plant development, and production of multiple and fasciated primary roots. Hypocotyl curvatures and root malformations formed in the seedling stage are apparent in the plant at maturity. The germination of seed was not affected by mechanical injury to the radicle tip of the seed, but stands were impaired because of the slower emergence rate. F. s.—E.B.O.

231 Ochs, R. and Wormer, T. M. Influence de l'alimentation en eau sur la croissance de l'arachide. [**Influence of the water supply on the growth of groundnuts.**] *Oléagineux* 1959, **14**, No. 5, 281–91, bibl. 5.

In 3 pot trials at the Pobé Station, Dahomey, the growth of the creeping groundnut variety 31–33 from Bambey, Senegal, was studied during the phases : germination-flowering, flowering-maturation, and maturation alone, under 5 soil-water conditions. The principal results were : (a) drought reduced the total number of leaves produced per plant, but increased the number of

leaves per unit of stem length ; (b) 62 days after sowing, the number of stems per plant was the same under the various treatments, but under wet conditions this number was attained more rapidly than under dry conditions ; (c) a period of active growth in length of the stems, approximately from the 30th to the 60th day from sowing, was preceded and followed by periods of reduced growth ; the period of active growth was greatly affected by drought ; this susceptibility to drought decreased later and became inappreciable at about the 75th day from sowing ; (d) the maximum production of dry matter was obtained only when the water supply was maintained near the maximum holding capacity of the soil ; (e) the total number of flowers produced was reduced considerably by drought, indirectly through its effect on stem growth, and directly, but to a limited extent, through its effect on the growth of the flower buds and on the average number of flowers per stem.—E.B.O.

232 PREVOT, P. Oléagineux tropicaux et oligo-éléments. [**Tropical oil crops and micronutrients.**] *Oléagineux* 1959, **14**, No. 6, 371–5, bibl. 16. [Inst. Rech. Huiles et Oléagineux]

A summary is given of the main results from studies at various stations in French Africa on micronutrient elements in relation to groundnuts.—E.B.O.

233 ROCHE, P. and others. Utilisation du diagnostic foliaire de l'arachide dans le secteur de conservation des sols vallée-témoin Lac Alaotra : essai d'interprétation des analyses foliaires effectuées sur arachides de 1953 à 1957. [**Utilization of the foliar diagnosis of groundnuts in the area of soil conservation "control valley" Lake Alaotra (Madagascar) : an attempt to interpret the foliar analyses carried out on groundnuts during 1953-7.**] *Agron. trop., Paris* 1959, **14**, No. 2, 165–97, English and Spanish summaries.

The study of NPK contents in groundnut leaves showed that the mineral nutrition of groundnuts is adequate when the following percentages on a dry-matter basis, are attained : N, 3·5 ; P, 0·2 ; K, 2·0. F. s.—E.B.O.

234 DEPARTMENT OF AGRICULTURE, SIERRA LEONE. **Field experiments with groundnuts, Njala.** *Dep. Agric. Sierra Leone 1957*, 1959, 31, [Exp. Sta., Njala, Sierra Leone]

In fertilizer trials with groundnuts a yield of 1420 lb. unshelled nuts/ac. was obtained from plots receiving approx. 4 cwt. superphosphate and 5 cwt. dolomitic limestone/ac. The inference from earlier experiments that the effect of superphosphate on groundnut yields was due to its Ca content, was confirmed.—S.M.J.

235 DEPARTMENT OF AGRICULTURE, NYASALAND PROTECTORATE. **Oil seeds. Groundnuts.** *Rep. Dep. Agric. Nyasald 1957-8 Pt II.* Zomba, 1959, 25–30.

In variety trials at 5 centres, Dixie Runner, Early Runner and A.M.2 compared favourably with the standard varieties. At Mbawa and Chitedze, all varieties giving yields above average were late in maturing. At lower altitudes the varieties yielding above average were early or medium-early, except for Dixie Runner, which gave high yields at all altitudes. In the Northern Province, bunch varieties did better than local runner types in the Misuku highlands (1000–1300 lb./ac. compared with 500 lb./ac.). On the Karonga Lakeshore, runner types did best, giving 2000 lb. shelled nuts/ac, compared with 1400 lb./ac. from bunch types. Mwitunde and A.R.S. Spanish groundnuts were lifted at various times and in various ways in an attempt to produce a reasonable hay crop as well as good yields of nuts. The tops when cut or lifted early and cured carefully, so as to retain the leaves, contained 15·5–17·0% crude protein and 25·5–27·0% fibre, but the yield of nuts was decreased by half compared with crops which were lifted when mature and windrowed. Lifting when mature and stooking did not significantly decrease the yield of nuts compared with windrowing and resulted in a loss of only 1·2 % of the crude protein of the hay. Groundnut plants affected with "pops" showed a higher K/Ca ratio than healthy plants.—A.M.H.

236 FONSECA, J. P. C. da. Aspectos fitossanitários do amendoim (mancarra) armazenado, na Guiné Portuguesa. 2. Montes e benténs no campo. [**Phytosanitary aspects of stored groundnuts (nuts and above-ground parts) in Portuguese Guinea. 2. Piles and containers in the field.**] *Garcia de Orta, Lisboa* 1958, **6**, No. 4, 605–16, bibl. 12, English and French summaries.

In Portuguese Guinea, the method of drying and storing groundnuts (fruits and above-ground parts) in the field is generally unsatisfactory, especially in protecting the nuts from *Dieuches armipes*, *D. patruelis*, *Aphanus sordidus* and *A. apicalis*. A simple and effective method for controlling these insects, is to dry the plants and nuts rapidly in small piles in the field, and then store them in well-raised containers (these are generally raised 0·30–1·50 m. from the ground). This method, however, gives no protection against *Caryedon gonagra*, the attack of which begins on the fruits while still in the field. The method recommended for controlling this pest consists in removing the fruits from the plant during, or immediately after, harvest and storing them under cover in suitable containers.—E.B.O.

237 BIENAYMÉ, A. and others. La conservation des graines d'arachide en Afrique Noire.

[**The storage of groundnut seeds in Negro Africa.**] *Oléagineux* 1959, **14**, No. 6, 349–60, illus.

This article supplies recent information on groundnut storage in French Negro Africa and gives an account of trials in Nigeria to reduce acidification and the damage caused by pests in stored groundnuts. [See also *Fld Crop Abstr.* 10 : 998.]—E.B.O.

PEAS

See also Abs. 389, 391, 394, 493.

238 Riepma, Wzn, P. Invloed van de standruimte en enkele andere milieufactoren op de samenstelling van de oogst bij erwten. [**The effect of spacing and some other environmental factors on the composition of the pea crop.**] *Meded. 19 Proefst. Akker- en Weidebouw* 1958, pp. 40, bibl. 13, illus., English summary.

Yields of peas depended on plant density to a limited extent only. A density of 40–70 plants/sq. m was sufficient for peas destined for harvesting dry, whereas 100 plants/sq. m was more suitable for the less branched, short-strawed early varieties. Optimum yields were not reached at low sowing rates when growing conditions were unfavourable, and there was a tendency to lodge at high sowing rates. About 66% of pods were borne on the lowest 3 fertile nodes. The number of seeds per pod was usually greatest in pods set on the second, third and fourth fertile nodes. The number of pods set and the weight per 100 seeds were greatest at low plant densities, and slightly greater on clay soils than on sandy soils. F. Eng. s.—R.B.

239 Netherlands. Dutch Information Centre for Agricultural Seeds, Supplementary seed bulletin. 1958. **Peas and field beans.** pp. 3.

A summary is given of the characteristics and performance of Rondo C.B. (which occupies more than 80% of the area under peas in the Netherlands) and 10 other varieties.—G.M.R.

240 Rijkslandbouwhogeschool, Gent. Veld-erwten. [(**Weed control in**) **field peas.**] *Versl. Centr. Onkruidonderz. 1958* [n.d.], 8.

Neburon sprayed at 1 kg/ha shortly after sowing blue peas killed *Stellaria media*, *Matricaria chamomilla*, and *Chenopodium album* but not *Lamium purpureum* or *Polygonum persicaria* ; the crop was not affected. Simazin gave insufficient weed control when applied at 0·5 kg/ha and damaged the crop when applied at 1 kg/ha. Calcium cyanamide at 200 kg/ha gave insufficient weed control. NaMCPA at 180 g/ha + NH_4 dinoseb at 600 g/ha, applied when the peas were 7–9 cm high, controlled *C. album*, *L. purpureum*, *P. persicaria*, *M. chamomilla* and *S. media*, and high crop yields were obtained.—R.B.

241 Olofsson, J. Växtföljdens betydelse för lyckadärtodling. [**The importance of crop rotation for successful pea-growing.**] *Lantm. Svenskt Land* 1959, **70**, No. 36, 772–4, illus. [Findus Försöksavdelning, Bjuv, Malmöhus, Sweden]

The importance of crop rotation for reducing the incidence of pea root rot caused by *Aphanomyces euteiches* is discussed. Under Swedish conditions, this pathogen is capable of persisting in the soil and it is particularly liable to damage pea crops under damp conditions. It is recommended that peas should not be grown on soil heavily infested with *A. euteiches* and should not be grown more than once every 7 years on lightly infested soils. Vetch and flax crops, though not seriously damaged by the pathogen, increase its incidence in the soil and should be excluded from the rotations in which peas are grown.—P.J.B.

242 Lavalleye, M. La désinfection des semences de pois. [**Seed treatment of peas.**] *Meded LandbHogesch. Gent.*, 1958, **23**, Nos. 3 and 4, 809–23, bibl. 5. [Inst. Nat. Amélior. Conserv. Légumes, Wesembeek-Ophem]

Infected seed treated with Hg compounds, TMTD, TMTD + quinone oxime benzoylhydrazine (QOB), and chlorodimethylphenoxyethanol gave significantly better seedling stands in the field than did the control.—R.B.

BEANS

See also Abs. 391, 493.

243 Rijkslandbouwhogeschool, Gent. Duivebonen. [(**Weed control in**) **tick beans.**] *Versl. Centr. Onkruidonderz. 1958* [n.d.], 9.

Dinoseb amine at 800 g/ha caused less damage to tick beans, but gave slightly less control of weeds, than did NH_4 dinoseb. MCPB could safely be used on beans for controlling *Chenopodium album*, *Cirsium arvense* and *Sinapis arvensis*.—R.B.

VETCH

244† Novožilov, I. I. [**Accelerating the ripening of spring vetch in the forest zone.**] [Russian] *Vestn. S-H. Nauki* (*J. agric. Sci., USSR*) 1959, **4**, No. 5, 129–32. [All-Union Inst. Fodders]

Vicia sativa is grown for green feed in the forest zone and even in the forest/tundra, but seed production is poor because the crop requires a warmer climate. Experiments to accelerate ripening by preharvest defoliation of the crops are reported and include tests made in the Kamensk/Ural'sk region [56°N., 62°E.], the Sverdlovsk area, and in the All-Union Institute of Fodders, Moscow Province. Water solutions of the following compounds were used : sulphate of ammonia, potassium sulphate, magnesium chlorate, caustic soda, sodium chloride,

endothal, and sodium thiocyanate. The toxic defoliants such as potassium cyanamide were not included because the vetch/oat straw is utilized as stock feed. Among the data recorded it is shown that a 15% solution of sulphate of ammonia or a 5% solution of sodium chloride applied at 500–600 l./ha, reduced the vegetative period by 7 days. By combining defoliation with the vernalization treatment developed at the Krasnoufimsk Station (*Fld Crop Abstr* 11 : 1097) it is claimed that the vegetative period can be shortened by 7–10 days and seed ripening advanced by 14–16 days. In growing spring vetch for seed in the forest zone, *Sinapis alba* is recommended for sowing with the vetch.—M.H.

245† SCHULZ, H. Gewinnung von Winterwickensaatgut durch die Anwendung der Doppelnutzung von Winterroggen-Wickgemischen. [**Production of winter-vetch seed by double utilization of winter rye/vetch mixtures.**] *Dtsch. Landw.* 1959, **10**, No. 9, 423–6, bibl. 5, illus. [Genshagen, E. Germany]

Experiments demonstrated that the yield of vetch seed from a vetch/rye mixture was as high after utilization for green fodder as after the normal management for seed production only. To achieve this end a variety of winter rye suitable for early cutting is sown early in Sept. at 150–200 kg/ha with 20 to 40 kg vetch/ha (according to whether the season is wet or dry, respectively). The fodder is cut when the awns appear. Heavy N manuring before and a light N dressing after the fodder cut are recommended.—D.B.

LUPINS

246† VAN DER KAMP, T. C. and RIEPMA WZN, P. Standruimteonderzoek bij de zaadwinning van gele voederlupine. [**Stand density investigations in yellow fodder lupins grown for seed.**] *Meded. 23 Proefst. Akker. Weidebouw, Wageningen* 1959, pp. 20, bibl. 7, mimeo.

Yellow fodder lupins [*Lupinus luteus*], var. Neven and Weiko III, were grown for 4 yr. on fertile sandy soil at seed rates of 50, 87·5 and 125 kg/ha in rows spaced 20, 33 and 50 cm apart. Yields and quality of the harvested seed were greatly influenced by weather. Seed rates had a greater influence on yield than did row spacings. An increase in seed rate from 87·5 to 125 kg/ha depressed seed yields, except in one year when seed with a low germination of 70% was used. Seed yields were correlated with plant populations where individual fields, but not individual years, were considered. The optimum plant population was 35–40 plants/sq.m. Row-spacings of 50 cm appeared to promote more even ripening than closer row-spacings, and weed control was relatively easier. With seed of 80% germination and a 1000-grain weight of 140 or 160 g, a seed rate of 74 or 86 kg/ha, respectively, would be expected to produce an optimum plant population.—R.B.

247† SKAARE, S. Forsøk med søtlupin. Stammeforsøk. Søtlupin sammenlignet med havreerter-grønfôr og fôrmargkål. **Experiments with sweet lupin. Variety experiments. Sweet lupin compared with mixed oats and peas harvested green and marrow stem kale.** *Forskn. Fors. Landbr.* 1958, **9**, No. 8, 629–41, bibl. 8, English summary.

In 9 trials during 1948–50 in eastern Norway, 5 yellow-flowered and 2 blue-flowered sweet lupin varieties were compared when grown for green forage. Mean fresh-weight yields ranged from 2282 kg to 2902 kg/decare. Dry-matter yields were highest for Namar (blue-flowered), Marmorert (yellow-flowered) and Borre (blue-flowered) with 297, 293 and 278 kg/decare, respectively. In a further series of 45 trials during 1951–7 comparisons were made of the yields of blue- and yellow-flowered lupins, harvested (a) when the top of the flowering spike was in bloom, or (b) when the whole flowering spike was in bloom, and of oat/pea mixture and marrowstem kale. Mean dry-matter yields for yellow-flowered lupin harvested at stages (a) and (b), blue-flowered lupins harvested at stages (a) and (b), oat/pea mixture and marrowstem kale were 325, 480, 230, 453, 502 and 711 kg/decare, respectively. In neither trial series were there any significant differences between the yields of blue- and yellow-flowered lupins, though the latter tended to yield best on light soils. It was concluded that the yellow-flowered were best suited for Norwegian conditions.—P.J.B.

248† BURNS, R. E. **Effect of acid scarification on lupin seed impermeability.** *Pl. Physiol.* 1959, **34**, No. 2, 107–8, bibl. 9, illus. [Agric. Res. Serv., Experiment, Georgia]

Examination of the path of entry of liquid into impermeable seeds of *Lupinus angustifolius* (a hard-seeded, sweet, blue variety), after they were scarified in sulphuric acid, indicated that entry occurs through either the hilar fissure or pits eroded through the testa. F. S.—D.B.

249 BIRECKA, H. and NALBORCZYK, E. **Biosynthesis of radioactive alkaloids of yellow and white lupins.** *Bull. Acad. polon. Sci.* 1959, **7**, No. 6, 205–11, bibl. 9. [Pl. Physiol. Dep., Coll. Agric., Warsaw, Poland]

GENERAL

250 BRYSSINE, P. Les variations phénotypiques du génotype chez les légumineuses en fonction de la dimension des semences. [**Phenotypical variations of the genotype in legumes in relation to seed size.**] *C.R. Soc. Sci. nat. phys.*

Maroc 1955, No. 7, pp. 21–41, bibl. 6, illus. [Received May, 1959]

The object of the trials described, carried out with peas, beans, chick-peas, soyabeans and lentils, was to study the effect of seed size on the development and yield of the plants produced. The general conclusion was that the plants obtained from large seed grew larger and yielded significantly more, than those obtained from smaller seeds. In another series of trials, in which medium-size seeds only were used, the influence of the cotyledons on the development and yield of plants was investigated. —E.B.O.

ROOT CROPS

SUGAR-BEET

See also Abs. 93, 394, 538.

251 Montaruli, A. Contributo allo studio delle migliori epoche di semina della bietola da zucchero nella Puglia e nella Lucania. [**Contribution to the study of the best sowing dates for sugar-beet in Puglia and Lucania (southern Italy).**] *Ann. Sper. agr.* 1958, **12,** No. 6, 1569–93, bibl. 24, English summary. [Ist. Agron. Univ. Bari]

The results from trials over one year indicated that for both spring and autumn sowings the highest yields of roots and sugar were obtained from the earliest sowing dates tested (10 Feb. for spring sowing ; 6 Aug., 10 and 14 Sept. and 27 Oct., for the autumn sowing in 4 localities, respectively). In trials with spring-sown crops, the variety Klein E gave higher yields of roots and sugar than Cesena P. In trials with autumn-sown crops in which 4 varieties were tested, Klein Polybeta gave markedly higher yields of roots and sugar and had a higher percentage of sugar in the roots than the other varieties, but showed some tendency to bolt and to have low seedling emergence; Cesena NSA, on the other hand, was resistant to bolting and had good germination ; the characteristics of Klein A A were intermediate.—E.B.O.

252 Anderson, D. T. and others. **Studies on transplanting sugar beets in southern Alberta.** *J. Amer. Soc. Sug. Beet Technol.* 1958, **10,** No. 2, 150–5, bibl. 5, illus. [Exp. Fm, Can. Dep. Agric., Lethbridge, Alberta, Canada]

Sugar-beet sown in a glasshouse in early April and transplanted at the normal sowing time in May yielded 4·2 – 9·2 tons/ac. more than drill-sown beet. There was no significant difference between sown and transplanted beet in the sucrose content of their roots. Roots of transplanted beets tended to be less regular in shape than those of sown beets.—R.B.

253 Dexter, S. T. and Miyamoto, T. **Acceleration of water uptake and germination of sugarbeet seed balls by surface coatings of hydrophilic colloids.** *Agron. J.* 1959, **51,** No. 7, 388–9, bibl. 3 in text, illus. [Michigan Agric. Exp. Sta., E. Lansing]

Rubbed and graded sugar-beet seed whose surface had been coated with gelatin, agar or algin absorbed water more rapidly from damp sand, and germinated more quickly in boxes of soil and in the field, than did untreated seed. Germination in dry soil was greatly improved. The treatments caused no apparent injury to the seed.—R.B.

254 Fischnich, O. and others. Einige pflanzen- und ackerbauliche Voraussetzungen für den Feldaufgang von Zuckerrüben-Monogerm saatgut. [**Some plant- and soil-conditions for field emergence of sugar-beet monogerm seed.**] *Z. Acker- u. PflBau* 1959, **108,** No. 1/2, 114-36, bibl. 26, illus., English summary. [Forschungsanst., f. Landwirtschaft, Braunschweig-Völkenrode, W. Germany]

Earlier work on cultivation measures for production of high-quality sugar-beet seed is reviewed. Results of more recent work on factors (soil moisture and temperature, salt concentration, method and depth of sowing) conditioning seedling emergence in the field are outlined. Respiration experiments have demonstrated enhanced respiratory activity immediately before bursting of the seed coat. Soil conditions which favour active respiration increase seedling emergence.—D.B.

255† Waisel, Y. and Bernstein, Ruth. **The effect of irrigation with saline water on the yield and sugar content of forage and sugar beet.** *Bull. Res. Coun. Israel* (*D*) 1959, **7D,** No. 2, 90–2, bibl. 4. [Hebrew Univ. of Jerusalem, and Hebrew Univ., Rehovot]

From preliminary culture trials there is evidence that : (a) yields of these crops are not lowered by saline irrigation (NaCl or KCl) ; (b) fodder-beet seedlings irrigated with salt solutions (0·1M and 0·2M) are not infected by *Physoderma leproides* ; (c) higher percentages of sugar occur in sugar-beet irrigated with saline water (mean = 19·00 ± 0·2 compared with 17·45 ± 0·5 in control.)—M.H.

256 Meier, W. Ergebnisse der Sortenprüfung bei Zuckerrüben 1956–1958. [**Results of sugar-beet varietal tests 1956-8.**] *Mitt. schweiz. Landw.* 1959, 7, No. 3, 33–6. [Eidg. Landw. Versuchsanstalten Lausanne, Liebefeld and Zürich-Oerlikon]

The trials reported in *Fld Crop Abstr.* 11 : 215 were continued with Maribo P (a Danish polyploid variety), Kleinwanzlebener Cercopoly (German), and Janasz AJ3 (Polish), again using

Kleinwanzlebener Polybeta as standard. The characteristics of each variety are tabulated and the results of the trials evaluated statistically. The first two varieties are not at present considered to be of importance for Switzerland. The low toxic-N content of Janasz AJ3 is a very favourable attribute of this variety.—D.B.

257 Rijkslandbouwhogeschool, Gent. Suikerbiet. [**(Weed control in) sugar-beet.**] *Versl. Centr. Onkruidonderz.* 1958. [n.d.], 10–11.

Propham applied at 7·5 kg/ha 6 days after sowing resulted in thinner sugar-beet stands and slightly reduced yields. CDEC at 16 kg/ha controlled weeds satisfactorily but yields of roots from these plots were low. $NaNO_3$ at 375 kg/ha controlled weeds to some extent, and its action was improved by adding an equal quantity of NaCl.—R.B.

258 Eckroth, E. G. and others. **Chemical control of annual grasses in sugar beets in Montana, Wyoming and Colorado.** *J. Amer. Soc. Sug. Beet Technol.* 1958, **10**, No. 2, 156–64. [Holly Sug. Corp., Sidney, Montana]

Satisfactory control of *Setaria* spp. and *Avena fatua*, without reduction in yield of sugar-beet, was obtained by applying 7·3 lb. DCU/ac. or 4 lb. endothal/ac. before sowing, EPTC (ethyl N,N-di-n-propylthiocarbamate) at 5 lb./ac. or endothal at 4–6 lb./ac. prior to weed emergence, and 4–6 lb. dalapon/ac. or 5 lb. endothal/ac. applied after the emergence of weeds. Beet stands were significantly reduced in some tests by 4–6 lb. endothal/ac., 5-10 lb. EPTC/ac. and 6 lb. dalapon/ac. Erbon at 6–12 lb./ac. caused heavy reductions in both stand and yield.—R.B.

259 Stapel, C. Om ulemper og fordele ved rapsdyrkning i sædskiftemæssig belysning. [**On the advantages and disadvantages of growing rape from the viewpoint of crop rotation.**] *Ugeskr. Landm.* 1958, **103**, No. 31, 471. [Statens Plantepatologiske Forsøg, Lyngby, Denmark]

The risk in Denmark of increasing the incidence of beet eelworm by including rape [*Brassica napus* var. *oleifera*] in rotations is discussed and data are given showing the reduction in sugar-beet yields where rape has been the previous crop.—P.J.B.

260† Lehr, J. J. and Henkens, C. H. **Threshold values of boron contents in Dutch soils in relation to boron deficiency symptoms in beet (heartrot).** *Rep. World Congress agric. Res. Rome*, 7–9 May, 1959, pp. 11, bibl. 13, French, German, Spanish and Italian summaries. [Pl. Nutr. Res. Lab., Wageningen, Netherlands]

261 Lüdecke, H. and Nitzsche, M. Entwicklungsverlauf verschiedener Zuckerrübensorten. [**The course of development of several varieties of sugar-beet.**] *Landw.-Angew. Wiss.* 1959, No. 95, pp. 59, bibl. 31, English and French summaries. [Inst. f. Zuckerrübenforschung, Göttingen, W. Germany]

During 1951–5, field trials were conducted with different groups of sugar-beet varieties to determine, under different weather conditions, the yield increase, sugar formation and nutrient uptake at different stages of development.—D.B.

262 Doxtator, C. W. **Gibberellic acid effects on seed and seedlings of sugar beets.** *J. Amer. Soc. Sug. Beet Technol.* 1958, **10**, No. 2, 117–23, bibl. 2, illus. [Amer. Crystal Sug. Co., Rocky Ford, Colorado]

Treatment of monogerm sugar-beet seed with 10,100 or 1000 ppm GA had no effect on germination, stem elongation or bolting. Seedlings of the varieties American No. 35 and NB1, treated with 1000 ppm GA as sprays or as soil applications, either at the 2-leaf stage or after 30 days of continuous light at 45°F., showed increased stem elongation with increasing rates of application when examined 5 months after treatment. Stem elongation as a result of GA treatment was more marked in American No. 35 than in NB1. Bolting was not induced by treatment in either variety.—R.B.

263 Dun I-Čen'. [**Experimental study of bolting in sugar-beet, peculiarities of flowering and fruiting.**] [Russian] *Agrobiologija* (*Agrobiology, Moscow*) 1959, No. 1, 74–8. [Agric. Academy of N-E China, Harbin]

264 Watson, D. J. and Witts, K. J. **The net assimilation rates of wild and cultivated beets.** *Ann. Bot., Lond.* 1959, **23**, No. 91, 431-9, bibl. 10. [Rothamsted Exp. Sta., Harpenden, Herts]

The net assimilation rate (E) of Kleinwanzleben sugar-beet was the same as that of three types of wild sea-beet (*Beta vulgaris* ssp. *maritima*) when the leaf-area index (L) was near to 1. In a subsequent period, when mean L of sugar-beet and of the leafiest wild beet type was 2·5, there was an inverse relation between E and L of the three wild types, and E of sugar-beet was then much greater than that of the wild type with equal L, but was little different from that of the wild type with smallest L (about 1·5). It is concluded that the development of sugar-beet from its wild ancestors by selection and breeding has not affected the intrinsic photosynthetic efficiency of the leaves, but has diminished the effect of mutal-interference between leaves, so that E falls less rapidly as L increases, i.e., it has decreased the leaf-density

dependence of E. This change may be related to the difference in form between sugar-beet and wild beet plants. F. s.—M.H.

265 LEFÈVRE, G. and HIROUX, G. Influence des fumures azotées et potassiques sur l'exportation d'une culture de betteraves sucrières. [**Influence of N and K fertilizers on the nutrient removal by a sugar-beet crop.**] *Ann. agron., Paris* 1958, **9**, No. 4, 443–52, English, German and Russian summaries. [Sta. Agron., Amiens, France]

266 RUSSELL, G. C. and DUBETZ, S. **The effect of different levels of fertility on the chemical composition of sugar beets.** *J. Amer. Soc. Sug. Beet Technol.* 1958, **10**, No. 2, 165–70, bibl. 7. [Exp. Fm, Can. Dep. Agric., Lethbridge, Alberta]

An 8-yr rotation made up of 1 yr wheat, 3 yr lucerne, wheat, 2 yr sugar-beet, and wheat, and a 4-yr rotation of wheat, sweet clover for hay, and 2 yr sugar-beet, were treated with f.y.m. at 20 or 30 tons/ac. applied in autumn before the first crop of sugar-beet and/or 100 lb. 11–48–0(NPK) fertilizer before each sugar-beet crop. Large increases in root yield, with only small variations in chemical composition, resulted from all treatments. Inorganic fertilizer applications increased root-P content and decreased root-K content, and tended to lower the N content of first-year roots. F.y.m. increased root-P content.—R.B.

267 WHITE, T. L. **Petiole analysis as a guide to the manuring of sugar beet.** *Plant and Soil* 1959, **11**, No. 1, 78–86, bibl. 8. [Univ. Coll. Wales, Aberystwyth]

N at 0, 25, 70, 105 and 140 lb./ac. was applied [time of application not stated] to sugar-beet grown on fertile soil. Petioles were sampled and analysed every 2 weeks between 29 July and 23 Sept. At any given sampling date the higher the rate of N applied, the higher the NO_3-N content of the petioles. Increases in root yield resulting from N applications were only just significant, while increases in yield of tops were highly significant. The yield of roots where no N was applied was 15·5 tons/ac.—R.B.

268 BALLATORE, G. P. and CARUSO, P. Esperienze sulla concimazione della barbabietola da zucchero (*Beta vulgaris* L.) a semina autunnale. [**Manurial trials with autumn-sown sugar-beet (*B. vulgaris*) (in Sicily).**] *Ann. Sper. agr.* 1959, **13**, No. 2, 205–48, bibl. 55, illus., English summary. [Ist. Agron. Univ. Palermo, Italy]

269 MANCINI, E. La sperimentazione bieticola italiana nell' ultimo cinquantennio. [**Experimentation on sugar-beet in Italy over the past 50 years.**] *Industr. saccar. ital.* 1959, Special No., 231–6. English summary.

FODDER-BEET

See also Abs. 394.

270† RIJKSLANDBOUWHOGESCHOOL, GENT. Voederbiet. [(**Weed control in**] **fodder-beet.**] *Versl. Centr. Onkruidonderz. 1958* [n.d.], 11–12.

Calcium cyanamide, applied before sowing fodder-beet, controlled weeds more effectively when applied in granular form than as a dust. *Stellaria media, Polygonum persicaria, P. aviculare* and annual grasses were effectively controlled by propham applied at 7·5–10 kg/ha before, or shortly after, sowing; seedling emergence was slightly reduced, but yields were not affected. NaPCP at $<7·5$ kg/ha could be used safely except under very dry conditions. $NaNO_3$ solutions controlled weeds only when surfactants were added; 300 kg $NaNO_3$ plus wetting agent caused some damage to fodder-beet leaves.—R.B.

TURNIPS

271† KORSTEN, L. H. J. Nieuwe knolvoetresistente stoppelknol C.B. [**A new "Centraal Bureau" club-root resistant turnip.**] *Meded. nat. coöp. Aan- en Verkoopv. Landb. Cent. Bur.* 1959, **43**, No. 5, 73–4, illus.

A high-yielding broad-leaved tetraploid variety of turnip [*Brassica rapa* var. *rapa*], bred in the Netherlands by the Centraal Bureau, has shown almost complete resistance in the field to attack by *Plasmodiophora brassicae*. A seed rate of 2–2·5 kg/ha is satisfactory, although its seed is somewhat larger than that of other varieties. A complete ground cover of leaves is achieved more rapidly than with any other turnip variety. Its roots are pointed and have a low earth tare. It is expected that this variety will be included in the Netherlands list of recommended varieties for 1960.—R.B.

POTATOES

See also Abs. 457, 474, 509, 526.

272 DEPARTMENT OF AGRICULTURE, NEW SOUTH WALES. **Potato seed spacing trials.** *Dep. Agric. N.S.W. Ann. Rep.* 1958, Guyra, 1959, 28.

Trials in Guyra district to determine the effect of planting potato setts at less than the standard distance of 12 in., on size and quality of resultant tubers, showed that close planting decreased the amount of hollow heart and growth cracking and lowered significantly the proportion of oversized tubers. F. s.—S.M.J.

273 CUNNINGHAM, C. E. and others. **Date of planting, length of growing season, vine killing, date of harvesting, and how they affect yields, specific gravity and maturity of potatoes.** *Bull. 579 Maine Agric. Exp. Sta.* 1959, pp. 31, bibl. 8, illus.

Katahdin and Kennebec potatoes were planted on 5, 15 and 25 May and on 4 June, and harvested on 14 Aug., 24 Aug., 4 Sept. and 14 Sept., to give growing seasons ranging from 71 to 132 days. Highest yields of Katahdin and Kennebec were obtained with growing seasons of 132 and 122 days, and maximum tuber sp. gr. with growing seasons of 132 and 101 days, respectively. Katahdin potatoes were grown for 5 yr, Kennebec for 3, Cherokee for 2 and Green Mountain for 1 yr to investigate the effects of haulm-killing on yield and sp. gr. of tubers. Planting took place in the third week of May, haulm-killing at 10-day intervals between mid-Aug. and early Sept., and lifting 10 and 20 days after haulm-killing. Tubers from plants not subjected to haulm-killing were lifted at 10-day intervals until early Oct. Haulm-killing reduced yields of all varieties. Kennebec and Cherokee yielded a greater weight of tubers than Katahdin at all dates of killing. Plants sprayed with sodium arsenite yielded an average of 18 bu./ac. tubers more than did those whose haulms were cut to simulate rotobeating. The sp. gr. of tubers lifted 10 or 20 days after haulm-killing tended to be lower than that of tubers lifted with green haulms at the same time as haulm-killing took place. The sp. gr. of tubers increased as the date of haulm-killing was delayed. After 4 Sept., increases in sp. gr. of tubers did not always occur. Rough handling of tubers produced less skin damage where tubers were lifted 20, instead of 10, days after haulm-killing. Haulms and tubers of Cherokee matured more rapidly than did those of Katahdin.—R.B.

274 Keller, E. R. and Gutzwiller, M. A. Wie wirkt sich gutes und schlechtes Vorkeimen der Kartoffeln auf Pflanzenentwicklung und Knol lenertrag aus? [**How does good and bad chitting of potatoes react on plant development and tuber yield?**] *Mitt. schweiz. Landw.* 1959, **7**, No. 4, 55–61, illus. [Eidg. Landw. Versuchsanst., Zürich-Oerlikon]

The results from 6 chitting techniques (using class A seed potatoes variety Bintje) are tabulated to show the number and length of sprouts per tuber, the rate of emergence of the shoots in the field, yield of tubers, their size grades, and the monetary returns. The highest yield and return was obtained after chitting in diffused light at 13–17°C for 6 weeks. When chitted like this for 3 weeks only, plant development was slower and many tubers were too small to be classed as ware. When chitting was done in direct sunlight the seed tubers hardened and yields and financial returns were considerably reduced.—D.B.

275 Tattersfield, J. R. [**Potatoes.**] *Fld Crop Expts. Gwebi 1954/5-1956/7* [cont. in] *Rhod. agric. J.* 1959, **56**, No. 1, 17.

Experiments to investigate the possibility of growing a summer potato crop showed that varietal resistance to late blight was more important than methods of fungicide application. The Dutch blight-resistant variety Furore yielded 154 bags/ac. compared with 3 bags/ac. from Up to Date, a susceptible variety. These results were considered to show that it was possible to obtain an economic yield of summer potatoes.—M.A.

276 Vigerust, Y. Forsøk med poteter på Ny Jords Forsøksgård Moldstad 1941–1956. **Experiments with potatoes at the Experiment Station, Moldstad, 1941-56.** *Forskn. Fors. Landbr.* 1958, **9**, No. 8, 659–78, bibl. 10, English summary.

The experiments took place on newly-cultivated acid peat (pH 4–4·5) on the island of Smola, W. Norway, with an average temperature for the period May to Sept. of 10·6°C and average monthly rainfall of 310 mm. In varietal trials during 1941–56, Up to Date gave the highest yield and exceeded Kerrs Pink (the control) in total tuber yield and yields of dry matter and large tubers. The yield of Saga, which seems to be suitable for peat soils, was about equal to that of Kerrs Pink. Early Puritan gave good yields, especially of large tubers, but its dry-matter content was low and its quality not very good. In trials with sprouted seed tubers, those sprouted for 4 weeks gave an average yield increase of 13% over non-sprouted. The greatest difference in yield occurred in relatively cold years. In planting-depth experiments with Kerrs Pink during 1949–53, the highest yields resulted from planting 0·4 cm deep ; almost equal yields were obtained from planting at 4 cm ; the yield of crops planted 8 cm deep were reduced. In spacing tests and planting-rate trials during 1949–53, seed potatoes each weighing 65 g were spaced 20, 30 and 40 cm apart in rows 60 cm apart. The best yield of tubers, of large tubers and of dry matter resulted from the 20-cm spacing. Spacing at 30 cm gave somewhat poorer results, but the difference was not significant. Spacing 40 cm apart produced a significant decrease in tuber yield of over 400 kg per decare. Spacing at 30 cm was found the most profitable. F. s.—G.M.R.

277 Jensen, J. Forsøg med tidlige brokimmune sorter af spisekartofler 1955–57. **Varietal trials with early cooking potatoes.** *Ber. 577 Stat. Forsøgsvirk. Plantekult.* [contained in] *Tidsskr. Planteavl* 1959, **63**, No. 1, 61–76, English summary.

The wart-immune varieties Primula, Tylstrup 48347, Doré, Tylstrup 48271, Sirtema, Sommerkrone and Eva were grown at 3 locations during 3 years in Denmark. They were lifted on 1 or 15 July to simulate early harvest, or at full maturity. Yields, cooking quality and manurial treatments are tabulated. Tylstrup 48347 gave the highest total yield, with 155, 288 and 382 hkg/ha at the 1st, 2nd and 3rd harvest dates, respectively. The tubers were of good cooking quality but small.—S.M.J.

278 Mastenbroek, C. Remona — erste aardappelras van het CB — Phytophthora-resistent en zeer produktief. [**Remona, the first potato variety from the Centraal Bureau : Phytophthora-resistant and very high yielding**] *Meded. nat. coop. Aan-en Verkoopv. Landb. Cent. Bur.* 1959, **43**, No. 3, 47–49, illus.

Remona, a new, shallow-eyed potato variety with *Solanum demissum* in its pedigree, is claimed to be one of the most productive of all potato varieties. Its cooking quality is similar to, and its average yield is 15% greater than, that of Eigenheimer. It is extremely resistant to late blight, but is susceptible to ring-spot. Second-growth may occur in some seasons and the haulms tend to lodge in bad weather. The tubers sprout easily, and require to be stored in a cool place. The recommended plant spacing is 55 × 60 cm or 50 × 65 cm.—R.B.

279 Pomme de Terre Française. Nouvelles variétés de pomme de terre en Pologne. [**New potato varieties in Poland.**] *Pomme d. Terre franç.* 1959, **22**, No. 240, 16–18.

An annotated list of 30 varieties is given.—E.B.O.

280 Toniolo, L. and de Poli, E. La patata : caratteri diagnostici e descrizione di alcune varietà. [**Potato : diagnostic characters and description of some varieties.**] *Progresso agric.* 1959, **5**, No. 5, 565–92, illus.

This article is concerned with those characters of the plant and tuber which should be considered when describing a potato variety. Descriptions are given of the principal potato varieties grown in Italy.—E.B.O.

281 Laumont, P. and Chevassus, A. Trois variétés de pommes de terre intéressantes pour l'Algérie [**Three potato varieties of interest to Algeria.**] *Elevage et Cultures* May 1959, No. 101, illus.

Descriptions are given of three potato varieties, Ker Bondy, Sientje and Belle de Locronan.—S.M.J.

282 Murphy, H. J. and others. **Maine potato variety trials for 1958.** *Misc. Publ. 636 Maine Agric. Exp. Sta.* [n.d.], pp. 37, illus.

Yields, tuber sizes, sp. gr., dry-matter contents, storage characteristics, and chip- and potato crisp-making characteristics are given for 21 potato varieties grown in varietal trials in Maine.—R.B.

283 Linares, S. P. J. Seis ensayos sobre papa. [**Six potato trials.**] *Agricultor venezol.* 1958, **22**, No. 204, 24–6.

From trials in central Venezuela with the potato varieties Red Bliss and Sebago, it is concluded that potatoes should be square-planted at 15–20 cm apart and that the best seed potatoes are whole potatoes of 40 g each. If cut tubers are used they should weigh 50 g each.—E.B.O.

284 Généreux, H. La résistance des variétés de pommes de terre au mildiou. [**The resistance of potato varieties to late blight.**] *Agriculture, Montreal* 1957, **14**, No. 1, 13–15, bibl. 6, illus. [Lab. Serv. Sci., Min. féd. Agric., Sainte-Anne-de-la-Pocatierè, Quebec]

Boone, Cherokee, Delus, Kennebec, Merrimack, Plymouth and Pungo are immune to the common strain of *Phytophthora infestans*. Keswick, Menominee, Ontario, Potomac, Saranac, Sebago, and Sequoia are relatively resistant.—R.B.

285 Rehm, E. Der Einfluss des Herkunftsgebietes auf den Gesundheitszustand und Ertrag der Kartoffeln. [**The influence of place of origin on the state of health and yield of potatoes.**] *Z. landw. Vers- u. UntersuchWes.* 1958, **4**, No. 4, 365–81, bibl. 1, Russian and English summaries. [Inst. f. landw. Vers- u. Untersuchungswesen, Halle-Lauchstädt, E. Germany]

Elite seed tubers of 8 varieties of potato were multiplied in Altmark and the progeny grown in 20 locations in the Harz mountains, some above 450 m, others at 180–260 m. Samples of the resulting crop were transferred to Lauchstädt (an area where potatoes are known to degenerate) where they were cultivated for 2 years. Yields and an evaluation of state of health were determined for each variety. From the results obtained so far, the Harz mountains, especially the higher altitudes, can be regarded as a healthy area for producing seed potatoes.—D.B.

286 Rijkslandbouwhogeschool, Gent. Aardappellen. [(**Weed control in**) **potatoes.**] *Versl. Centr. Onkraidonderz. 1958* [n.d.], 9–10.

NaPCP at 10–15 kg/ha and NH_4DNC controlled germinating annual broad-leaved weeds in potatoes, but gave only partial control of *Stellaria media, Polygonum aviculare, Matricaria chamomilla* and *Senecio vulgaris* when applied early. PCP controlled a broader range of weeds than did DNC or dinoseb and, when applied late, controlled a high proportion of *Sonchus arvensis*. Haulm development and tuber production were somewhat depressed by these herbicides, and off-flavoured tubers tended to occur in plots treated with large doses of PCP or oil-borne DNC. Calcium cyanamide at 200–400 kg/ha gave good weed control when applied late. CIPC at 3 kg/ha and simazin at 1·25 – 2·5 kg/ha caused crop damage, and 2,4,5-T reduced tuber yields. MCPA caused less damage than other phenoxyaliphatic herbicides. Late varieties, especially Bona, were more resistant to MCPA than earlier varieties such as Eigenheimer. The latter suffered less damage where sprayed when 7–9 cm high than at a later stage of development.—R.B.

287 Choudhuri, H. C. **Spray tests for control of potato blight in the hills of West Bengal. 2.** *Europ. Potato J.* 1959, **2**, No. 2, 89–99, bibl. 4, French and German summaries. [Dep. Agric. W. Bengal, Writer's Buildings, Calcutta, India]

Trials were carried out with 6 fungicides for controlling late blight [*Phytophthora infestans*] in Darjeeling Red Round potatoes under conditions of high rainfall. Fungicides were applied at concentrations of 1·25, 2·5, 3, 4 or 5 lb./100 l. water, when the plants were 6 in. high, and again at intervals of 6, 8, 10 or 14 days. The fungicidal solutions were applied at 100 gal./ac. for the first 3 applications and at 150 gal./ac. thereafter. All fungicides sprayed at 6- or 8-day intervals controlled blight until 136 days after planting. The optimum spray interval was 8 days. Increasing the concentration of fungicide progressively increased yield. Copravit and coppesan resulted in the highest average yields, which were significantly greater than yields from plots treated with shell copper. Differences in yield between plots treated with coppesan, copper, sandoz, copravit, perenox and dithane were not significant. [See *Fld Crop Abstr.* 8 : 546.]—R.B.

288 Hyre, R. A. and others. **The relation of rainfall, relative humidity and temperature to late blight [of potatoes] in Maine.** *Pl. Dis. Rptr* 1959, **43**, No. 1, 51–4, bibl. 3, illus. [Maine Agric. Exp. Sta., Orono]

289 Brandes, G. A. and others. **A review of uniform dosage and timing experiments comparing maneb and zineb fungicides on potatoes in Maine, New York, Indiana and New Hampshire—1958.** *Pl. Dis. Rptr* 1959, **43**, No. 2, 201–12. [New Hampshire Exp. Sta., USA]

290 Darling, H. M. **Control of the potato rot nematode in Wisconsin.** *Pl. Dis. Rptr* 1959, **43**, No. 2, 239–42, bibl. 7. [Coll. Agric., Univ. Wisconsin, Madison]

In trials in Wisconsin in 1954 to control the potato rot nematode (*Ditylenchus destructor*), split plough-sole applications of ethylene dibromide at a total rate of 6 gal./ac. (4 in the first and 2 in the second application) were made in the spring and autumn. In the crop produced on approximately 30 ac. thus treated, no infested tubers were found either at harvest or after 4–6 months' storage. Sound tubers were also produced from a heavily infested 24 ac. field, and a lightly infested 4 ac. field, which were replanted in the following season with no further treatment. F. s.—E.B.O.

291 Campacci, C. A. Ocorrência do "ácaro branco" em batatinha. [**Occurrence of white mite (*Hemitarsonemus latus*) on potatoes (in Brazil).**] *Biológico, S. Paulo* 1959, **25**, No. 6, 111–14, bibl. 5, illus.

In experimental fields two treatments with diazinon, 100 g/100 l. of water, at 5-day interval, controlled *H. latus* on potatoes.—E.B.O.

292 Hansen, S. E. Undersøgelser over variation i tørstofindholdet i sunde og bladrullesygeinficerede kartoffelknolde. [**Investigations on the relation between leafroll infection and dry-matter content of potato tubers**] *Ber. 573 Stat. Forsøgsvirk. Plantekult.* [contained in] *Tidsskr. Planteavl* 1959, **62**, No. 5, 901–13, bibl. 6, English summary.

In investigations on 3 varieties of potato, carried out from 1953–6, leafroll-infected tubers of Alpha had a lower dry-matter content (20·6%) than healthy tubers (24%) but in Bintje and Up to Date the differences between healthy and infected tubers were only about 1%.—S.M.J.

293 Rønsen, K. Avkastningsforsøk med virusfrie og virus-X-smitta poteter. **Yield trials with virus-free and virus X-infected potatoes.** *Forskn. Fors. Landbr* 1958, **9**, No. 8, 643–57, bibl. 18, English summary. [State Exp. Sta. Løken, Norway]

Results of yield trials of the potato varieties Åspotet, Saga and Kerrs Pink at Løken are reported (61°5′N, altitude 550 m). Åspotet was tested for 7 years. Yields varied considerably from year to year. In 4 out of 7 years virus-free potatoes yielded more than virus-X-infected ; in 2 years the results were equal, and in one year the material infected with virus X yielded more than the virus-free. This variation is discussed in relation to environmental conditions. F. s.—G.M.R.

294 Baribeau, B. Anatomie et composition de la pomme de terre. [**Anatomy and composition of the potato tuber.**] *Agriculture, Montréal* 1957, **14**, No. 1, 10–12, bibl. 4, illus. [Div. Prod. Pl. Min. Agric. Canada]

295 Ranjan, S. and Budhraja, Bimla. **Metabolic changes in potato tubers under anaerobiosis.** *Proc. Nat. Inst. Sci. India* 1959, **25**, Part B, No. 1, 44–8, bibl. 2. [Allahabad Univ. (R.S.) ; and Govt. Coll. Women, Ludhiana (B.B.)]

296 Scaramella Petri, Piera and Mazzi, Serena. Processi di riparazione in giovani assi di *Solanum tuberosum.* [**Cicatrization processes in young sprouts of *S. tuberosum.***] *Nuovo G. bot. ital.* 1957, **64**, No. 1–2, 125–36, bibl. 24, illus., English summary. [Ist. Bot. Univ. Bologna, Italy] [Received Oct., 1959]

297 Schuphan, W. Studien über essentielle Aminosaüren in Kartoffeln. 1. Mittelung : Die Indianerkartoffel *Solanum stenotomum* Juz. et Buk. **Studies on essential amino acids in potatoes. 1st report. The indigenous potato *Solanum stenotomum*.** *Qual. Plant. et Materiae veg.* 1959, **6**, No. 1, 1-10, bibl. 10, English and French summaries. [Bundesanst. Qualitätsforsch. Pfl. Erzeugnisse, Geisenheim/Rh., Germany]

Data are given of the chemical composition of N-containing compounds in the tubers of the South American cultivated potato *S. stenotomum*. Tubers harvested at Geisenheim in 1955 contained 24% dry matter, of which 10·6% was crude protein.—R.B.

298 Tamaki, K. and others. **The effect of maleic hydrazide early foliage spray on the growth behaviour and the variations of chemical components of potato plants.** [Japanese] *Tech. Bull. Fac. Agric., Kagawa* 1958, **9**, No. 3, 119–25, bibl. 33, English summary.

Growth inhibition was observed 10 days after spraying potato plants with MH. Later on, the plants became dwarfed and thick. Tuber growth was inhibited because carbohydrates were not translocated to tubers after flowering. The N content of tops and tubers decreased slowly, instead of rapidly, as growth proceeded. F. Eng. s.—D.B.

299 Fischnich, O. and others. Entwicklungsbeeinflussung der Kartoffelpflanze durch Gibberellin [**Influence of gibberellin on the development of the potato plant.**] *Landbauforschung Völkenrode* 1959, **9**, No. 1, 12–14, bibl. 6, illus.

Six days after emergence, the apices of potato plants (var. Virginia) were given from 1 to 4 treatments, each after an interval of 1 week, with gibberellin in amounts ranging between 5 and 100 μg per treatment. Three days after the first treatment, elongation of internodes and a paler green colour of the leaves were visible, and these effects were most marked during the first 14 days after treatment. In 2–3 weeks, several leaf-bearing stolons emerged from the soil, and in 42 days flower buds formed. Root growth was not affected. Plants which received the maximum treatment (4 $\times$ 100μg gibberellin) produced small, elongated tubers, frequently on a common stolon. The sprouts from tubers (var. Bona) treated with gibberellin were morphologically different from tubers treated with rindite. The sprouts emerged later than after rindite treatment and they were more numerous. Tubers lifted early and treated immediately after harvest with both rindite and gibberellin sprouted earlier than when treated with one of these substances alone and the sprouts resembled in form those produced by gibberellin.—D.B.

300 Buch, Margaret L. **A study of the acidic growth inhibitor of potato tubers in relation to their dormancy.** *Diss. Abstr.* 1959, **19**, No. 12, 3067–8. [Cornell Univ., Ithaca, New York State]

The studies reported were undertaken to study further the theory of Hemberg that an acidic growth inhibitor was present in the peel of freshly-harvested potato tubers, which prevented their sprouting immediately after harvest. In tests with the tubers of 4 potato varieties stored at 4 different temperatures, the content of acidic growth inhibitor in the area of peel around the eyes, as determined by the *Avena* coleoptile test, did not change during the period from harvest to natural sprouting. From the results of these and other experiments, it was concluded that the presence of acidic growth inhibitor is not responsible for the absence of sprouting in freshly-harvested tubers.—P.J.B.

301 Ničiporovič, A. A. and Čmora, S. N. [**The utilization of solar radiation during photosynthesis in potato crops.**] [Russian] *Fiziol. Rast. (Pl. Physiol. USSR)* 1958, **5**, No. 4, 320–8, bibl. 7, illus., English summary. [Timirjazev Inst. Pl. Physiol., Moscow]

By the use of a field photointegrator it is shown that approximately equal amounts of the sun's rays are absorbed by different plants with leaf areas of about the same magnitude. From 65 to 75% of the photosynthetic energy is absorbed by potato crops with a leaf area of 35,000–40,000 sq. m/ha. With further increase in leaf area, the amount of absorbed energy changes very little. When 4–6% of the energy absorbed by the plants is utilized in photosynthesis, an increase of 150–200 kg/ha dry matter is produced. F. Eng. s.—M.H.

302 I-Hua, Sjao. [**The effect of light intensity on development of the potato plant.**] [Russian] *Zap. Leningr. sel'sk. Inst. (Papers of Leningrad Agric. Inst.)* 1958, No. 13, 41–52, bibl. 17, illus. [Received July, 1959]

The experiments were designed : (1) to study the influence of lowered light intensity on the development of the potato plant after the photophase ; and (2) to clarify the cause of low yields of seed (true) from plants subjected to shading at the critical period. The tests (2 replications) were made at Puškin in the Leningrad Province (where, in summer, daylength reaches 18 hr.) with the variety Kameraz. The data show that there is a critical period, in regard to lowered intensity of light, for the production of seed by potato. The weakened intensity of light (20% from normal) at this period results in a partial collapse of the [flower] buds, and a lowering of total seed weight. The critical period begins at the time of

tetrad-formation in the first buds of the inflorescence of the main stem, and its duration is 8–10 days. Weakened light does not hinder tuber formation, but lowers tuber yields somewhat unevenly at different periods, depending on duration of the plant's exposure to the weak light. It is assumed that the flow of nutrients to the tubers is affected. —M.H.

303 Chapman, H. W. **Daylength effects on potato tuberization.** *Abstr. 42nd. ann. Meet. Potato Ass. Amer.* 1958, p. 1, mimeo.

Active growing points or entire potato plants subjected to short-day conditions (9-hr. photoperiods) produced a hormone-like substance which, after 14 days of short-day treatment, was present in sufficient quantity to bring about tuber differentiation at the stolon tips. Tuber formation occurred in stocks previously subjected to long day lengths when tops given short-day treatment were grafted on to them. Differential photoperiodic treatment of potato plants with 2 stems resulted in tuber formation only on stolons attached to the stems given short-day treatment.—R.B.

304 Mokronosov, A. T. and Lundina, T. N. [**The role of the dark and light periods of the day in the photoperiodic reaction of the potato plant.**] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1959, **127,** No. 4, 924–7, bibl. 15, illus. [Ural'sk State Univ.]

Experiments were made to study the effect (on *Solanum tuberosum* and *S. demissum*) of subjecting the plants to dark intervals during daylight and to light intervals during the night, special attention being given to tuber formation. While the potato forms tubers in short-day conditions only, it has been claimed by various authors that it flowers in long days only (see, e.g. *Fld Crop Abstr.* 9 : 1284). The experimental plants were grown (in vessels or on plots) as follows : (1) long, natural daylength at the latitude of Sverdlovsk [58°N., 61°E.] ; (2) short, 10-hr. day ; (3) short day, with inclusion of 20 min. darkness at mid-day ; (4) short day, with inclusion of a 20 min. light period at midnight (from a lamp giving 500 w. per sq. m when placed 60 cm above the plants). In *S. demissum*, tuber formation in short-day conditions begins 47–56 days earlier than in long days. The transition to the phase of tuber formation is possible under natural daylength [in Sverdlovsk] only towards the end of the summer when long days are curtailed. Under (3), tuber formation is unaffected, but (4) retards tuber formation by 32–41 days. In *S. tuberosum*, tuber formation is induced by (2) in 20 days, compared with 27 days by (1), but this 7-day earlier onset of the phase is annulled by (4). It is concluded that, in both species, the absence of flowering in short day results not from a retarding influence of short day on the reproductive phase, but from factors which, under short day, enhance tuber formation as a means of regeneration at the expense of flower formation. The duration of growth from seedling emergence to dying of the leaves is 15–30 days less in (2) than (1), but this acceleration of development is mostly cancelled by (4) while it is unaffected by (3). It is concluded that the transition to tuber formation in the potato plant is conditioned by those reactions to light and darkness which condition flowering in short-day plants. There is evidence that the dark reactions in potato are longer than 7 hours ; darkness must not be interrupted, and its effect is not cumulative. This conforms with the characteristics of the dark reactions which determine flowering in short-day species.—M.H.

305 Gyrisco, G. C. and others. **Studies of flavors and odors of potatoes and red kidney beans grown in rotation with lindane-treated red clover.** *J. econ. Ent.* 1959, **52,** No. 3, 473–5, bibl. 7. [Cornell Univ., Ithaca, New York]

Potatoes were grown for 3 consecutive years, following 2 yr of red clover treated each year with 1 lb. lindane/ac. Off-flavours occurred in the potato tubers during the first 2 yr of cropping and were worst during the second year.—R.B.

306 Henkens, C. H. Bestrijding van mangaangebrek door bemesting van de grond. [**Control of manganese deficency by manurial treatment.**] *Landbouwk. Tijdschr., Wageningen* 1959, **71,** No. 1, 17–21, bibl. 3. [Inst. Soil Fertility, Gröningen.]

In field trials, soil applications of Mn increased yields of potatoes, though the crop showed no symptoms of Mn deficiency.—G.M.R.

307 Feddersen, H. D. **Nitrogen fertilizers for potatoes.** *J. Dep. Agric. S. Aust.*, 1959, **62,** No. 12, 538–40.

In trials on light sandy soil at Mount Gambier, S. Australia, post-emergence applications of 2 cwt. of ammonium sulphate or calcium ammonium nitrate/ac. resulted in higher tuber yields (17·4 and 17·3 tons/ac. respectively) than rates of 4 cwt./ac. at planting (14·6 and 16·2 tons/ac.).—S.M.J.

308 Winkler, H. and Ohlsson, S. Försök med lokaliserad gödsling till potatis utförda vid Statens Försöksgård Flahult åren 1948–1956. [**Trials with potatoes, using different placements of phosphorus and potassium fertilizers.**] *Medd. 92 Stat. JordbrFörsök, Uppsala* 1958, pp. 20, bibl. 17, English summary.

In trials during 1948–56 at the Flahult Experimental Farm, S. Sweden, P and K were applied to potatoes as granulated superphosphate and 40% K salts, respectively. The following treatments (in kg/ha) were compared, the figures in brackets

denoting the increase in tuber yield compared with the untreated control : (a) 300 P, harrowed in (10%), (b) 300 P, broadcast in the furrows (10%), (c) 300 K, harrowed-in (21%), (d) 300 K, broadcast in the furrows (15%), (e) 300 P + K, mixed, harrowed-in (31%), (f) 300 P + 300 K, mixed and broadcast in the furrows (46%)(, (g) 300 P + 300 K, mixed and drilled in the furrows on both sides of the tubers (48%), (h) 300 P + 300 K, fertilizers drilled separately in the furrow, on each side of the tubers (42%). During 1952–6 the following additional treatments were applied : (i)600 P + 600 K, mixed and harrowed-in (j) 600 P + 600 K, mixed and broadcast in the furrows. The differences between treatments (f), (g), and (h) were not significant. The rates of application used in treatments (i) and (j) did not increase yields significantly above those where the 300 kg rate were used. Method of application had no apparent influence on content of dry matter and starch, or on average weight and distribution of tuber size by classes.—G.M.R.

309 McConaghy, S. and McAllister, J. S. V. **Fertilizer placement for the potato crop.** *Res. Exp. Rec. Minist. Agric. N. Ireland 1958*, 1959, **8**, 41–52, bibl. 3, illus.

Experiments carried out at 6 centres in N. Ireland showed that where the potato crop was planted by machine on flat ground, the most effective use of compound fertilizer dressings was obtained when the fertilizer was applied in a band slightly below the level of the seed tubers ; sideways displacement of up to 3 in. did not reduce the efficiency of the dressing. When the fertilizer was broadcast on flat ground or placed above the level of the base of the seed, larger dressings were required to obtain full yields. F. s.—S.M.J.

310 Estes, G. O. and others. **A new look at magnesium and sulfur fertilization of potatoes.** *Maine Fm Res.* 1959, **6**, No. 4, 5–6. [Maine Agric. Exp. Sta., Orono]

Glasshouse tests were carried out with Katahdin potatoes grown on virgin Caribou soil given Mg and S fertilizers each at 0, 10, 20 and 30 lb./ac. Mg applications, in combination with S at 0 and 30 lb./ac., consistently and significantly depressed yields. Highest yields, in total dry-weight of plants, were obtained on unfertilized soil. Combinations of 10 lb. S with 30 lb. Mg, 30 lb. S without Mg and 10 lb. S. with 10 lb. Mg., did not depress yields significantly. The ratio of S to Mg appears to be an important factor in potato growing on this soil.—R.B.

311 Burton, W. G. and others. **The effect of γ-irradiation upon the sugar content of potatoes.** *Europ. Potato J.* 1959, **2**, No. 2, 105–16, bibl 8, French and German summaries. [Ditton Lab., Larkfield, Maidstone, and U.K. Atomic Energy Authority Radiation Lab., Wantage]

King Edward potatoes given 10,000 rads γ-radiation in Nov., Jan., Feb. or April and stored at 10°C. and 96% R.H. showed a marked increase in the content of non-reducing sugar. This reached a maximum 5 days after irradiation, and then fell to approximately the same level as that in untreated tubers within 26 days after irradiation, independent of the date on which irradiation took place. A smaller, though still marked, effect occurred where the dosage was reduced to 3000 rads. Irradiation with 3000 or 10,000 rads caused a temporary increase in the content of reducing sugar ; the later the date of irradiation, the greater the increase. The rate of loss of reducing sugar after the maximum level had been reached was always slow. There was no marked difference between the 2 radiation treatments in their effect on reducing sugar. The content of non-reducing sugars in non-irradiated potatoes increased after prolonged storage at 10°C. Irradiated potatoes began to show an increase in non-reducing sugar content at about the same time, but the effect was more rapid, and complete tissue breakdown eventually occurred ; this was accelerated by increasing the storage temperature to 20°C. Irradiated potatoes were unsuitable for domestic consumption by mid-Aug. irrespective of the date of irradiation. Tubers irradiated before Feb. were unsuitable for potato crisp manufacture by the end of May ; those irradiated in Feb. or later were permanently unsuitable for crisps. F. s.—R.B.

312 Félix, B. A. Resultados de algunos ensayos de conservación de papas. [**Results from some trials on potato storage (in Peru).**] *Bol. trim. Exp. agropec., Lima* 1958, **7**, No. 2, 20–7, bibl. 5 [Esta. Exp. Agríc. Junin]

The results are given from trials with sprout inhibitors used for treating potatoes stored for consumption and seed. After 6 months' storage, potatoes treated with Cl-IPC (50 mg/kg potatoes) had no sprouts and were in excellent condition ; those treated with ipnogerm (3 g dust/kg of potatoes) also had no sprouts and were in good condition.—E.B.O.

313 Bisset, G. B. and others. **The economics of potato storage.** 1959, pp. 51, bibl. 28, illus, 24 × 15 cm., 5s.

The differences in costs between storing potatoes in clamps and storing in buildings during 1956–7 are analysed.—M.A.

314 Hansen, F. and Henriksen, J. B. Undersøgelser over opbevaringens indflydelse på kartoflers spiring og på angreb af kartoflens sortbensyge. **Investigations into the effect of storage on potato sprouting and attacks of black-**

leg. *Ber. 578 Stat. Forsøgsvirk. Plantekult.* [contained in] *Tidsskr. Planteavl.* 1959, **63**, No. 1, 77–124, bibl. 26, illus., English summary.

Experiments with the variety Bintje showed that the incidence of blackleg (*Erwinia carotovora*) was greatest where the tubers were stored in houses without forced ventilation, in clamps, or when harvest took place in rainy weather. Healthy tubers removed from clamps by forks sprouted quicker and more evenly than those removed from storage by forks and riddled.—S.M.J.

SWEET-POTATOES

315 Greig, J. K. **Chemical weed control in sweet potato plantings.** *Proc. 15th N. Cent. Weed Contr. Conf.* [USA] 1958, 9. [Kansas Agric. Exp. Sta., Manhattan]

In trials on loamy sand soil in Kansas, herbicides were applied 2 days after sweet-potato [*Ipomoea batatas*] slips were planted on 23 and 24 May and 6 and 7 June. Herbicides used included NPA, neburon, and 3Y9. In trials with the varieties Lakan, Kandee and Nemagold, crops treated with Alanap-2 (90% NPA) at 3 and 6 lb./ac. and neburon at 3 lb./ac. significantly outyielded untreated controls. Lakan significantly outyielded the other varieties in these trials and there was evidence that Kandee suffered most phytotoxicy. In a second series of trials with Kandee only, yields of marketable tubers were significantly increased by treatment with Alanap-2 at 2, 6 and 9 lb./ac. and neburon at 1·5 and 3 lb./ac., while neburon at 3 lb./ac. resulted in significantly higher yields than any other treatment.—P.J.B.

316 Sakai, K. and Hirosaki, S. **Studies on the maturity of root thickening in sweet potato. 1. Relationship between root thickening and several characters.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 303–4, bibl. 1, English summary. [Kyushu Agric. Exp. Sta.]

Relationships exist between time of harvesting and root thickening, number of tubers of marketable size, dry-matter accumulation and tuber/root ratio. F. Eng. S.—D.B.

317 Naka, J. and Tamaki, K. **Studies on the physiological nature of sweet potato plants. 7. On the relations between the variations of carbohydrates in the shoots and roots during the growing period. 8. On the relations between the variation of nitrogen compounds in the shoots and roots during the growing period.** [Japanese] *Tech. Bull. Fac. Agric., Kagawa* 1957, **9**, No. 2, 47–58, bibl. 23, English summaries.

This work is a continuation of studies noted in *Fld Crop Abstr.* 10 : 1505. F. Eng. S.—D.B.

318 Naka, J. and Tamaki, K. **Studies on the physiological nature of sweet potato plants. 11. On the variations of chemical components in the various regions of the seed tuber during the storage period.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 305–6, bibl. 13, English summary. [Kagawa Univ.]

Changes were studied in the amounts of the various carbohydrate components, N compounds and moisture in various tissues of the seed tuber of *Ipomoea batatas* from early to late stages of storage. F. Eng. S.—D.B.

319 Yamamoto, Y. and Tomita, Y. **Studies on the bio-pigments and vitamins. 4. Correlative changes in the carotene, total carotenoids and the other constituents of sweet potatoes during storage.** (1). *Mem. Fac. Agric., Kagoshima* 1958, **3**, No. 2, 63–8, bibl. 12.

CASSAVA AND YAMS

320 Miège, J. Variétés éburnéennes de manioc à lobes foliaires arrondis et nervures présentant une excroissance. [**Cassava varieties of the Ivory Coast having leaves with rounded lobes and ribs with an appendix.**] *J. Agric. trop. et Bot. appl.* 1958, **5**, No. 11, 691–718, bibl. 6, illus. [Fac. Sci., Dakar]

A group of cassava varieties, grown by Africans in Middle and Upper Ivory Coast (in areas of open forest or savanna), are characterized by : susceptibility to virus disease ; globular appearance of the plant ; and the following leaf characters, rounded lobes, central lobe generally shorter than the lateral ones, a number of lobes on each leaf smaller than in most other varieties, an appendix on the principal rib of each lobe on the lower side of the leaf. The appendix is longer (up to 25 mm long in humid regions) on the central lobe than on the lateral ones. Other characters, concerning branching and flowering, were studied in the varieties Guebi and Agba Kpouka.—E.B.O.

321 Raghavan, R. S. **A note on some South Indian species of the genus *Dioscorea*.** *Curr. Sci.* 1959, **28**, No. 8, 337–8, bibl. 4. [Central Bot. Lab., Allahabad, India]

Tubers of 3 species of *Dioscorea* were examined for chromosome number. In *D. wallichii*, which is edible, the number is 2n = 40. In *D. tomentosa* there are at least 2 races the chromosome numbers being 2n = 40 and 2n = 60. *D. pentaphylla* also has 2 races, var. *linnæi* (edible) and var. *jacquemontii* with 2n = 40 and var. *communis* (avoided as food) with 2n = 80.—D.B.

322 Twum-Barima, K. and Cameron, J. **A study of yam farming in North Mampong. Ashanti.** [n.d.], pp.69. Univ. Coll. Ghana, Fac. Agric. [Received July, 1959]

The economic status, conditions and problems of commercial yam-producers in the Ejura area of Ghana are studied.—S.M.J.

KALE

323† National Institute for Research in Dairying, Great Britain. **Marrow stem kale.** *Rep. Nat. Inst. Res. Dairy., Reading* 1958, 34.

A commercial stock and the Green Stem variety of marrow stem kale were grown with a spacing of 18 in. and 2 in. between plants in the row during the 1957–8 season. There were no significant differences between the mean dry-matter yields of the varieties which were 3·5 and 2·1 tons/ac. at the 2- and 18-in. spacings, respectively. The Green Stem variety was the easiest to cut and the stem contained an average of 15% fibre, compared with 22% for the commercial variety.—P.J..B.

FIBRE CROPS

COTTON

See also Abs. 387, 392, 397, 457, 528, 529.

324 Smith, R. [**Optimum methods for cotton cultivation in Tanganyika**] *Progr. Reps Exp. Stas. Emp. Cott. Gr. Corp., Tanganyika Terr., Eastern Province 1957-58.* 1959, 3.

Cotton grown in trials at 7 centres in the Eastern Province to find the optimum methods for cotton cultivation in the area gave the following yields in lb. seed cotton/ac. : (a) cotton sown in Feb., 820, in March, 680, (b) sown at 36 × 12 in., 1 plant/hole, 816, sown at 36 × 36 in., 2 plants/hole, 685 and (c) sprayed with 0·1 lb. BHC + 1 lb. DDT/ac. per wk. for 8 weeks, 1033, dusted with BHC/DDT, 736.—S.M.J.

325 Parry, G. Améliorations cotonnières en sols salins. Six années d'expérimentation : 1953–1958. [**Improvement of cotton on saline soils. Six years of trials : 1953-8.**] *Cot. et Fibr. trop.* 1958, **13**, No. 3, 353–92, bibl. 18, illus., English summary. [Sta. Ét. Sols Salins, Hamadena, Algeria]

On the saline soils of Algeria (average salt content 2 parts per thousand), irrigated cotton (*Gossypium barbadense*) is one of the few profitable crops and yields 1700 kg, or more, seed cotton per ha. The cotton area is about 3000–5000 ha but there are possibilities for further expansion. The following are the principal conclusions from the trials described. The best sowing time is April and the best plant density 100,000 plants per ha (1 m between ridges, 20 cm between pockets, 2 plants per pocket) ; if sowing takes place in the first half of May the plant density can be increased to 130,000 per ha. Thinning and hoeing should be carried out as early as possible. Of the varieties tested, Karnak 55 and Dendera were the best.—E.B.O.

326 Litovčenko, M. [**Biological basis of the density of the cotton plantation on meadow soils.**] [Russian] *Hlopkovodstvo* (*Cott. Prod.*) 1959, **9**, No. 5, 39–41. [Uzbek Agric. Inst.]

In Uzbekistan almost half of the cotton sowings are on irrigated meadow soils, although much attention has hitherto been given to cotton production on sierozems. During April/May in the Samarkand Province, the meadow soils at a depth of 10 cm are 1–3°F. lower than the sierozems, and consequently the [flower ?] budding stage in cotton on the meadow soils is 2 or 3 days later than on the sierozems. In 1958 the author studied on these soil types cotton stands of 33 – 201 thousand plants/ha obtained by growing from 1 to 7 plants on pockets spaced at 60 × 50 cm. Percentage ripening was calculated on the basis of the number of bolls which ripened before the onset of the first [autumn] frosts. The data show that a density of 4 [or more] plants per pocket tends to lower percentage of ripening and to increase boll shedding ; it is therefore recommended [for both soil types] that 3 plants be established in half the pockets and 4 in the other half. It is considered that, under Samarkand conditions, best results are obtained by planting 120–125 thousand plants/ha in pockets spaced at 50 × 50 cm or 60 × 50 cm and with 3 or 4 plants per pocket in each case.—M.H.

327 Calzada, B. J. and others. Una innovación en el cultivo de las socas del algodonero que consiste en chapodo alto con riego previo. [**An innovation in growing cotton ratoons which consists in high pruning preceded by irrigation.**] *Inf. 64 Div. Exp. agric. Minist. Agric. Peru* 1959, pp. 10, bibl. 2.

In 8 plot trials the practice of topping cotton ratoons to a height of 40 cm after an irrigation treatment resulted in yields higher than those obtained from the usual practice of topping to 20 cm with no irrigation. This new practice is recommended for all the valleys of the Costa Central of Peru where pest attack is light and irrigation water is available 30 days before topping. An irrigation lasting 2 hr [quantity not stated] is generally sufficient.—E.B.O.

328 Leuwers, A. Pluviométrie et culture cotonnière au Nord-Cameroun. [**Rainfall and cotton cultivation in north Cameroons (French Equatorial Africa).**] *Cot. et Fibr. trop.* 1958, **13**, No. 3, 409–24, bibl. 7, illus., English summary.

In north Cameroons the dry season lasts from 15 Oct. to 15 Apr. and the rainy season for

the rest of the year, but rainfall is badly distributed for growing crops, particularly cotton. On the basis of rainfall data for the past 10 years, an attempt is made to determine the best sowing dates, and the most suitable cultural methods and pest-control methods for cotton in various regions of north Cameroons.—E.B.O.

329 DIVEKAR, C. B. and KURTKOTI, F. B. **Effects of various rotations on the cotton crop.** *Mysore agric. J.* 1958, **33**, No. 4, 189–95, bibl. 9. [Agric. Res. Sta., Dharwar, Mysore, India]

The performance of cotton (*Gossypium herbaceum*) var. Jayadar under different rotations with sorghum and/or groundnut was studied for 10 yr. From the standpoint of earliness and yield of seed cotton, the best rotation was groundnut/cotton/sorghum, the yield of seed cotton being 32% higher than from the normal sorghum/cotton rotation. On the other hand, the yield of seed cotton from the rotation groundnut/sorghum/cotton was 4·5% lower than from the normal rotation. The position of sorghum in the 3-course rotation is therefore important. Sorghum has a harmful effect on the soil and a subsequent cotton crop and this is intensified by its better growth when following groundnuts.—D.B.

330 KULIKOVA, M. [**Dates for defoliating cotton crops with new preparations.**] [Russian] *Hlopkovodstvo* (*Cott. Prod.*) 1959, **9**, No. 7, 39–41. [Fergana Zonal Exp. Sta.]

In 1958 the growth and development of the cotton variety 108-F in Fergana was delayed by 10–12 days. Tests with various defoliants (calcium cyanamide, magnesium chlorate and sodium ethylxanthogenate) showed that the best was 0·5% solution of magnesium chlorate applied on 23 Sept. (defoliation per plant on the 18th day following spraying was 90·7% and the seed-cotton yield 4480 kg/ha). Under the same conditions a 2% solution of calcium cyanamide applied on 14 Sept. gave 89·4% defoliation after 18 days, and 4250 kg seed-cotton/ha.—M.H.

331 BULLETIN DE MADAGASCAR. Le coton dans la province de Majunga. [**Cotton in the province of Majunga** (**Madagascar**).] *Bull. Madagascar* 1959, **9**, No. 152, 53–9.

Trials were carried out in 1956–7 with the object of introducing cotton into the province of Majunga where there are possibilities for growing it with or without irrigation. The variety Stoneville was found more suitable than Egyptian varieties. Cotton-growing in this region is dependent on control of pests, mainly *Heliothis* sp., *Earias* sp., *Dysdercus* sp. and thrips. Good results were obtained by applying 5 insecticidal treatments (60, 75, 85, 100 and 115 days from sowing) ; the first and last treatments were based on endrin, the others on endrin plus DDT (in the proportion of 1 : 4), the rate of active material applied per ha per treatment being 200–600 g of endrin and 800–2400 g of DDT. A rotation including cotton, groundnuts and forage crops is considered.—E.B.O.

332 BALLATORE, G. P. Il problema delle cultivar di cotone. [**The problem of cotton cultivars.**] *Progresso agric.* 1959, **5**, No. 6, 661–80, illus. [Ist. Agron. Univ. Palermo, Sicily]

An account is given of investigations to study cotton varieties suitable for non-irrigated cultivation in Italy, particularly, Sicily. Because of drought yields of raw cotton in Sicily seldom exceed 1000 kg/ha. The growing of the varieties Coker 100 Wilt, Stoneville 2 B and Delta-Pine 15 is recommended. The variety Andalucia, tested for the past 2 years only, appears to be the best because of its productivity and earliness.—E.B.O.

333 DEMOL, J. Une nouvelle variété cotonnière au Congo belge, le "Bambesa 49". [**Bambesa 49, a new cotton variety in the Belgian Congo.**] *Bull. Inform. I.N.É.A.C.* 1959, **8**, No. 4, 249–62, bibl. 2, map. [Sta. Rech. Agron., Bambesa]

The characteristics are given of Bambesa 49, a cotton variety in process of multiplication, suitable for the areas of the Belgian Congo north of the equator, where it yields 10–20% more fibre than Stoneville 5, the variety now grown.—E.B.O.

334 CARVALHO, M. DE. Possibilidade de cultivo de algodões do tipo egípcio em Moçambique. [**Possibility of growing Egyptian cotton in Mozambique.**] *Mem. Trab. 34 Cent. Invest. cient. algod.* Lourenço Marques, 1958, pp. 103–7, English summary.

As a result of field trials in Mozambique, the irrigated cultivation of Egyptian cotton (*Gossypium barbadense*) was introduced into the Limpopo Valley.—E.B.O.

335 KHAN, H. **AC. 134—A new long staple variety of cotton for Montgomery and Lahore districts.** *Pakist. Cotts* 1959, **3**, No. 3, 39.

A.C. 134 is a tall variety. Its hairiness gives resistance to attack by *Empoasca devastans*. It has a long flowering period and is ready for the first picking in late October. For maximum yields it should be sown in late May or early June and manured at the peak of the flowering period (late Aug.), with 50 lb. N as $(NH_4)_2SO_4$. The staple length of this variety is over 1 in. and the ginning outturn is 37%. The oil content of the seed is 3–4% higher than in other varieties cultivated in these districts.—D.B.

336 BABAJAN, A. [**A system of cultural and prophylactic measures for the control**

of *Verticillium* wilt in cotton.] [Russian] *Hlopkovodstvo (Cott. Prod.)* 1959, **9**, No. 7, 41–6. [Armenian Sci. Res. Inst. Agric.]

The cultural measures discussed in regard to Armenian conditions include : pre-sowing tilling of the soil ; increasing the density of the plant stand ; adjustment of sowing date ; use of fertilizers and of irrigation ; and the removal, after harvest, of all plants with their roots.—M.H.

337 GARBER, R. H. and HOUSTON, B. R. **An inhibitor of *Verticillium albo-atrum* in cotton seed.** *Phytopathology* 1959, **49**, No. 7, 449–50, illus. [Univ. California, Davis]

Seeds of wilt-susceptible Deltapine 15 and wilt-resistant Acala 4–42 cotton were placed in Petri dishes on an agar substrate to which spores of *V. albo-atrum* had been added. No fungus developed in the area immediately surrounding the seed, but spores removed from this area produced abundant growth on agar in the absence of seed, indicating that the inhibitory substance exuding from the seeds was fungistatic, but not fungicidal. When 25 g seed were soaked in 30 ml water for 1 min. at 160°F., the resulting solution inhibited fungus growth. The soaked seeds failed to re-accumulate the inhibitory factor after 1 month of storage.—R.B.

338 SEGURA, C. B. Acción de los desinfectantes protectores sobre el poder germinativo y energía vital de la semilla del algodonero. [**Effect of disinfectants on the germinating capacity and germinating energy of cotton seed.**] *Bol. trim. Exp. agropec., Lima* 1958, **7**, No. 3, 2–7. [Esta. Exp. Agríc., La Molina, Peru]

In trials to test preparations used for controlling *Rhizoctonia solani* on cotton seed, brassicol and rhizoctol, each applied at 300 or 450 g per 100 kg of seed, reduced in several cases the germinating energy of seed, this reduction being greater in seeds kept at 14·8°C. than at 15·2° or 16·3°C. After 11 days, however, the germination of treated seed was similar to that of the untreated controls.—E.B.O.

339 MORTON, D. J. **The control of cotton root-knot by the addition of 1, 2 dibromo-3-chloropropane to irrigation water.** *Pl. Dis. Rptr* 1959, **43**, No. 2, 243–7, illus. [Agric. Exp. Sta., New Mexico State Univ., State College]

The addition to irrigation water of 1 gal. 1, 2 dibromo-3-chloropropane in an emulsifiable form/ac., 10 days before sowing cotton, almost completely controlled the root-knot nematode (*Meloidogyne* sp.), increased cotton yields by 117% (0·7 bales/ac.) but reduced slightly seedling stand counts. It is thought that one application would be effective for at least 2 years.—E.B.O.

340 MORTON, D. J. **The use of a granular nematocide applied at listing in controlling cotton root-knot.** *Pl. Dis. Rptr* 1959, **43**, No. 2, 248–52, bibl. 2, illus. [Agric. Exp. Sta., New Mexico State Univ., State College]

Granules containing 8·6% nemagon were listed into the soil 29 days before sowing cotton, and were compared with some liquid nematocides, applied 4 days later, for effectiveness in controlling cotton root-knot (caused by *Meloidogyne* sp.) and increasing yields. All nematocides reduced root-knot and increased yields significantly but nemagon S-1 and fumazone, both in liquid form, were significantly better than nemagon granules. These, however, were easier and cheaper to apply than the liquids.—E.B.O.

341 BRAZZEL, J. R. and MARTIN, D. F. **Pink bollworm resistance in cotton.** *J. econ. Ent.* 1959, **52**, No. 3, 385–90, bibl. 7. [Texas Agric. Exp. Sta., College Station]

The hybrid cotton Stoneville 2B × *Gossypium tomentosum* showed a high degree of antibiosis to larvae of *Pectinophora gossypiella*. *G. thurberi* showed a lesser degree of antibiosis, but in field tests showed considerable resistance to infestation, as the moths preferred other types of cotton for oviposition.—R.B.

342 TARR, S. A. J. **Seed treatment of cotton against diseases and insect pests.** *Outlook on Agric.* 1959, **2**, No. 4, 168–77, bibl. 32, illus.

In experiments in the Sudan Gezira on the control of blackarm (*Xanthomonas malvacearum*), seed dressed with Abavit powder, containing 8·5% Hg as mercuric chloride, applied at a rate of 1 part per 150 of seed (by weight) produced an average of 170 infected seedlings/ac. compared with 700/ac. from seed treated with Abavit B (containing 5–7% Hg). Colouring the seed with brilliant green and methylene blue (0·05–0·1% dye to seed) resulted in poor control of blackarm. Water-soluble methoxyethylmercuriacetate (MEMA) was more effective against blackarm than mercuric chloride-iodide per unit of Hg applied. Seed treated with MEMA solution containing 0·39% Hg, at 50 cc/lb. seed, reduced infected seedling numbers to 60/ac. compared with 150/ac. for Abavit powder. MEMA treatment reduced the need for resowing and blackarm infection and increased yields by an average of 18–20%. A standard short-wet treatment using 50 cc MEMA solution containing 0·39% Hg/lb. seed is recommended for blackarm control in the Gezira. In the USA, treatment with ceresan M slurry for the control of *Ascochyta gossypii* increased yields by an average of 11%.—S.M.J.

343 ILIEV, P. and ILCHEV, D. **Experiments on cotton growth stimulation 1954-57.** *Bull. Methodi Popoff Inst. Biology, Sofia* 1958, **11**, 15–, English summary. [Sofia, Bulgaria]

Under dry-land conditions, increased yields were obtained when cotton seed had been soaked for 24 hr in an aqueous solution of 2000 ppm KBr before sowing. Growth of cotton plants was increased by spraying with KBr solution during bud formation and yields were increased by 2·9%. Spraying irrigated cotton with KBr solution at bud formation and again when the blossom was forming increased yields by 16·8%, compared with controls. [From *Emp. Cott. Gr. Rev.* 36, No. 3, 228, Abs. 121.] —S.M.J.

344 WILES, A. B. **Calcium deficiency in cotton seedlings.** *Pl. Dis. Rptr* 1959, **43**, No. 3, 365–7, bibl. 7, illus. [Mississippi Agric. Exp. Sta., State College]

The absence or unavailability of Ca for utilization by cotton seedlings produces symptoms ranging from collapse and death of the primary radicle, the terminal bud and portions of the hypocotyl, to chlorosis and necrosis of the cotyledonary leaves and stunting of the young plants. Adequate control of Ca deficiency was obtained when fuzzy or machine-delinted cotton seeds were rolled in dry calcium sulphate prior to sowing. F. S.—E.B.O.

345 MAUNEY, J. R. and BALL, E. **The axillary buds of *Gossypium*.** *Bull. Torrey bot. Cl.* 1959, **86**, No. 2, 236–44, bibl. 10, illus. [N. Carolina State Coll., Raleigh]

Examination of *Gossypium hirsutum* var. Coker 100 W showed that 2 buds were formed in the axil of each leaf. During early development the first-formed bud grew nearly centrally in the leaf axil, but became displaced to one side as it developed further. In 95% of leaves, the displacement was in the same sense as the direction of phyllotaxy. A strap-like prophyll developed from this bud, and a second bud, developing in its axil, eventually occupied a central position. The first-developed, off-centre bud gave rise to monopodial vegetative branches on the lower part of the stem and sympodial reproductive branches on the upper part. In vigorous plants in which growth of the central bud also occurred, a prophyll and a third axillary bud developed. The branching potential of the bud positions in cotton appeared to be equal, and the reason why some nodes may bear vegetative, vegetative and reproductive, or solely reproductive branches, is not yet clear.—R.B.

346 HESSLER, L. E. and others. **Cotton fiber development studies at suboptimum temperatures.** *Agron. J.* 1959, **51**, No. 3, 125–8, bibl. 10. [Texas Agric. Exp. Sta., College Station]

Flowers of irrigated cotton were marked weekly in 1955 and '6 and bolls developing from them were sampled 21, 28, 35 and 42 days after formation, throughout the period of fruit-setting. Significant correlations were found between fibre cellulose content and fibre crystallinity, and between crystallinity and strength, in cotton fibre at all stages of development. Fibres increased in length until the 35th day. Bolls from flowers opening on 20 August developed shorter fibres than did earlier-formed bolls. In 1955, the number of degree-hours per week below 70°F. (T) increased rapidly between early and late cotton formation, and the fineness and strength of cotton fibres decreased progressively throughout the season. In 1956, temperatures were more favourable and fibre properties changed relatively little during the season. In 1955, but not in 1956, there was a significant positive correlation between T and sugar-content of fibres, and a significant negative correlation between T and fibre cellulose content. In a comparison of the cellulose : sugar ratio in 2 cotton varieties [not named] in 1955, the ratio in one var. was higher than that in the other, both during favourable and unfavourable growing conditions.—R.B.

347 JAROŠ, N. P. **Effect of water supply on biochemical changes in cotton leaves and seeds.** [Russian] *Fiziol. Rast.* (*Pl. Physiol., USSR*) 1959, **6**, No. 2, 205–8, bibl. 6. [All-Union Inst. Pl. Industry, Leningrad]

This work was designed to study the effect of soil moisture, under field conditions, on biochemical conversions in cotton leaves and seeds during ripening, with and without irrigation of the crop. The indicators of the plants' chemical condition were carbohydrate/protein metabolism, catalase activity and content of ascorbic acid. In the seeds the accumulation of oil, protein and the toxic pigment, gossypol, was studied. The types of cotton tested included early, medium-early and late-ripening varieties of *Gossypium hirstum*, *G. barbadense* and *G. arboreum*. The crops were grown at the Central Asiatic Experiment Station, near Taškent, in two variants, (1) in an irrigated field where, during the vegetative period, soil moisture was 65–70% of the water-holding capacity, and (2) in plots where irrigation was withheld during the vegetation period and soil moisture was 35–40% of water-holding capacity. Samples of the leaves were taken at the time of mass budding [of flowers], at flowering and at fruit formation and ripening (16–20 Aug.). The data show that unirrigated cotton has a smaller assimilating surface (which results from restricted growth) compared with irrigated crops. The relation between this effect of moisture deficiency on growth and development is discussed in relation to the biochemical aspects noted above. There is evidence, for example, that when the soil's moisture-holding capacity is 65–70%, oil in the seeds accumulates during a prolonged period and, at full ripening, the amount is greater than in seeds of unirrigated crops. The gossypol content of the seeds is lowered in unirrigated crops.—M.H.

348 Shaikh, A. M. and others. **Mixed cropping of cotton in Sind. 3. Part 2. The effect of mixed cropping on the metabolism of the cotton plant and the quality of seed, and their amelioration by means of nitrogenous fertilizers.** *Pakist. Cotts* 1959, **3**, No. 3, 29–38, bibl. 13.

The work reported in *Fld Crop Abstr.* 11 : 714 was continued. Chemical analyses of roots, stalks, leaves and flowers of cotton showed that sorghum deprived cotton of NPK, but not Ca, and seriously interfered with the build-up of dry matter. The cotton seeds were lighter in weight, had a reduced oil content and a higher free fatty-acid content than when cotton was grown alone. The severity of deterioration of the seed crop increased with the sowing rate of sorghum (2·5, 5, 10 lb./ac.). 75 lb. N as $(NH_4)_2SO_4$, in 3 split applications after harvesting sorghum, restored growth and increased weight and oil content of seeds, but prolonged the vegetative phase. Ginning percentages are given.—D.B.

349 Franquin, P. L'estimation du manganèse du sol en rapport avec le phénomène de toxicité. [**The determination of Mn in the soil in relation to Mn toxicity (in cotton).**] *Cot. et Fibr. trop.* 1958, **13**, No. 3, 393–408, bibl. 14, illus., English summary.

350 Hacskaylo, J. and Scales, A. L. **Some effects of guthion alone and in combination with DDT and of a dieldrin-DDT mixture on growth and fruiting of the cotton plant.** *J. econ. Ent.* 1959, **52**, No. 3, 396–8, bibl. 4. [Texas Agric. Exp. Sta., College Station]

In glasshouse tests, insect-free cotton of the variety Empire was treated with guthion at 0·25, 0·5 and 1 lb./ac., guthion + DDT at 0·25 and 2 lb./ac., or dieldrin + DDT at 0·25 and 2 lb./ac. The dry weight of plants was slightly reduced by guthion at 0·5 and 1 lb./ac., and considerably reduced by guthion + DDT and dieldrin + DDT. Plants treated with guthion at 0·25 and 0·5 lb./ac. produced more flowers and bolls than the controls and maturation was slightly retarded. Treatments containing DDT and/or dieldrin reduced flower production and hastened maturation. DDT + dieldrin reduced boll-set by 20%. All insecticidal treatments reduced boll size and yield of seed cotton, but had no effect on fibre quality.—R.B.

351 Wybenga, J. M. **The fertilization of cotton, with special reference to the use of nitrate of soda.** *Information, Nitrate Corp. Chile Ltd.* 1959, pp. 13, bibl. 51. [Pl. Nutr. Res. Lab., Chilean Nitrate Agric. Serv., Wageningen, Netherlands]

This is a review article.—R.B.

352 Peat, J. E. and Brown, K. J. [**Manurial and fertilizers trials with cotton on hill-sand.**] *Progr. Reps Exp. Stas Emp. Cott. Gr. Corp., Tanganyika Terr., Lake Province 1957-58.* 1959, 6–7. [Ukiriguru, Tanganyika]

In cotton trials at Ukiriguru in which rates of 0, 50, 100 or 200 lb. $(NH_4)_2SO_4$ with or without 150 lb. double superphosphate or 6 tons compost/ac. were applied to plots, the highest rates of N + P + compost treatment resulted in increases of about 1000 lb. seed cotton/ac. over the controls. Dec. appeared to be the best month for sowing in order to avoid opening of the cotton during the April/May rains.—S.M.J.

353 Bannink, L. La fumure minérale du cotonnier dans la zone forestière de l'Uele. [**The chemical manuring of cotton in the forest area of the Uele (Belgian Congo).**] *Bull. Inform. INÉAC* 1959, **8**, No. 3, 147–51, bibl. 1. [Sta. Rech. Agron., Bambesa]

The results from trials in 1957–8 indicated that applying 100 kg superphosphate/ha increased cotton yields by an average of 42% ; this rate is recommended for clay soils similar to those at Bambesa. [See also *Fld Crop Abstr.* 12 : 322.]—E.B.O.

354 Sattar, A. **Cottons of the world. Chapters 3 and 4.** *Pakist. Cotts.* 1959, **3**, No. 3, 54–91.

This contribution compares the fibre properties of cottons throughout the world and discusses the relationship between fibre properties and the processing performance of cottons.—D.B.

FIBRE FLAX

See also Abs. 394, 397.

355 Frederiksen, P. F. Forsøg med spindhørsorter [**Trials with fibre-flax varieties.**] *Lin* 1959, **13**, No. 3/4, 29–40, bibl. 6. [Forskningsinstituttet for Handels- og Industriplanter, Kolding, Denmark]

The results are given of trials with 13 fibre-flax varieties conducted under the auspices of the Danish Flax Research Institute at a number of locations in Denmark during 1954–8. In 20 trials, Wiera (the standard) gave average scutched-flax yields of 812 kg/ha and was outyielded only by Ile de France (16 trials), which yielded 822 kg/ha. The respective yields of Noblesse, Madonna and Regenboog were 41, 47 and 55 kg/ha less than Wiera. Seed yields of Wiera averaged 1092 kg/ha and were exceeded only by those of Regenboog, Concurrent and Solido, with 67, 36 and 17 kg/ha higher yields, respectively. The oil content of the seed of Regenboog was very high and exceeded that of Wiera by 3%. Wiera and L.B.W. 59 had the stiffest straw. Norfolk, Mandarin and Wiera matured earliest and Ile de France and Margareta latest. It was concluded that Wiera was the best variety for Danish conditions.—P.J.B.

356 Aukema, J. J. and Friederich, J. C. Verslag van de proeven met zaadontsmettingsmiddelen in vlas in 1957 en 1958. [**Report on trials with seed disinfectants in flax in 1957 and 1958.**] *Meded. 25 Proefst. Akker. Weidebouw, Wageningen* 1959, pp. 32, mimeo.

Disinfection of flax seed partially infected with *Ascochyta* sp. or *Botrytis* sp. using any of 16 seed disinfectants in 1957, gave field stands significantly better than those obtained from untreated seed. Treatments containing thiram or Hg gave the best results. In similar trials in 1958, none of 13 seed disinfectants gave effective control of *Botrytis* sp. or *Ascochyta* sp. infecting the seed-coat. It was recommended that only seed known to be healthy before it is treated should be used by flax growers. —R.B.

357 de Tempe, J. **Botrytis infection of flax seed.** *Fibra* 1958, **3,** No. 3, 66–79, bibl. 13, French summary.

The results of the studies reported showed that thiram, currently recommended in the Netherlands for the treatment of flax seed, may be relatively ineffective against infection by *Botrytis cinerea*, against which thiram + Hg mixture, or volatile Hg compounds appear to be more effective.—P.J.B.

358 Anselme, C. Essais de désinfection de semences de lin infestées par *Botrytis cinerea.* [**Trials on the disinfection of flax seed infected with *Botrytis cinerea.***] *Fibra* 1958, **3,** No. 3, 80–3, English summary.

In germination tests, best control of *B. cinerea* on flax seed followed treatment with : (a) a 50% formulation of TMTD at 500 g/quintal and (b) a mixture of 50% TMTD + 2% phenyl mercuric chloride at 300 g quintal. F. a. s.—P.J.B.

359 Sullerov, A. I. [**The photophase and subsequent stages in the ontogenetic development of *Linum usitatissimum.***] [Russian] *Zap. Leningr. sel'sk. Inst.* (*Papers of Leningrad Agric. Inst.*) 1958, No. 13, 27–33, bibl. 17. [Received July, 1959]

Earlier work of the author established that, in flax (a long-day plant) a critical period in regard to a deficiency in light intensity occurs at the time of pollen-tetrad formation ; this period persists for 8 to 10 days. A deficiency of light at this time results in lower yields of seed and fibre. The present work was designed in 1953–4, at Puškin, Leningrad Province, with the flax variety Svetoč to determine the end of the photophase and thereby the onset of the critical period in the plant's ontogeny with regard to susceptibility to lowered light intensity. The data show that the completion of the photophase coincides with the beginning of flower-bud formation, and this phase normally lasts 17 days. Between the end of the photophase and the critical period for lowered light intensity (the period of pollen-tetrad formation) there is in this variety yet another developmental phase which lasts from 11 to 15 days during which the inflorescence is initiated and the flower buds are formed, with rudimentary anthers and embryo. After passing the photophase, development of this flax variety is not retarded by short day (especially if it occurs in the period following inflorescence initiation). A greater number of capsules and increased yield of seed are produced in short day. Transferring the plants from long-day to short-day conditions induces changes in the character of the stems and inflorescences from the fibre type to the dwarf/branched type.—M.H.

360 Larsen, A. Orienterende karforsøg med vanding af spindhør. **Pilot-scale pot experiments on irrigation of spinning flax.** *Ber. 574 Stat. Forsøgsvirk, Plantekult.* [contained in] *Tidsskr Planteavl* 1959, **63,** No. 1, 1–33, illus., English summary.

The effect was investigated of intermittent irrigation on the quality of straw and seed and yield of fibre-flax. Water was added daily to flax grown in pots so as to maintain the soil at 30, 60 and 95% field capacity, or water was with-held before or after flowering. The highest rate of water supply resulted in yields of 91·6 hkg straw and 19·7 hkg seed/ha. A period of drought after flowering reduced the yield of straw to 34·9 hkg and that of seed to 4·3 hkg/ha, while drought during stem elongation reduced straw yields to 24·8 hkg and seed yields to 5·3 hkg/ha and resulted in the production of a course, light fibre.—S.M.J.

361 Cooke, G. W. and Warren, R. G. **Manuring experiments on flax.** *Emp. J. exp. Agric.* 1959, **27,** 107, 171–86, bibl. 1. [Rothamsted Exp. Sta., Harpenden, Herts]

Experiments showed that manuring of flax is only justified when there is evidence of a soil deficiency in one or more of the major plant nutrients. F. s.—S.M.J.

362 Aukema, J. J. and Friederich, J. C. De invloed van bemesting met kali en stikstof in verschillende vormen op vezelvlas. [**The effect of manuring fibre-flax with various sources of potassium and nitrogen.**] *Meded. 20 Proefst. Akker. Weidebouw, Wageningen* 1959, pp. 15, mimeo.

N applications ranging from 23 to 41 kg/ha significantly increased stem fibre-content and yields of de-seeded flax, but had no significant effect on fibre quality. Manuring with K had no significant effect on yield or quality.—R.B.

HEMP

363 Tschaneff, K. Der Hanfbau in Bulgarien [**Hemp culture in Bulgaria.**] *Fibra* 1959, **4,** No. 2, 59–67, German summary.

Details are given of cultural practices used for hemp [*Cannabis sativa*] in Bulgaria. Plant-breeding with hemp in Bulgaria is based on introduced Bolognese types and the results are given of trials with recently-produced varieties.—P.J.B.

364 Simor, P. Der ungarische Hanf [**Hungarian hemp.**] *Lin* 1958, **12,** No. 4, 33–43, bibl. 6, Swedish summary.

A review is given of progress in the breeding and classification of the stems and fibre of hemp [*Cannabis sativa*] in Hungary. The results are given of trials during 1954–5 with varieties and hybrids of Hungarian and introduced hemp.—P.J.B.

365 Sironval, C. Sur la répartition des sexes dans une population de chanvres cultivés en jours courts de génération en génération. [**On the distribution of sexes in a hemp (*Cannabis sativa*) population, grown from one generation to another under short-day conditions.**] *Bull. Soc. Bot. Belg.* 1959, **91,** No. 2, 255–65, bibl. 5, illus. [Lab. Physiol. Vég., Univ. Liège, Belgium]

KENAF

See also Abs. 397, 457

366 Kuo, S. G. and Siang, W. N. **Experiments on seed disinfection for the control of kenaf anthracnose. 1. Moisture content of seed in relation to the effectiveness of hot-water treatment.** [Chinese] *Acta phytopath. sinica* 1959, **5,** No. 1, 45–52a, bibl. 5, English summary. [Inst. Microbiol., Academia Sinica]

Complete disinfection of *Hibiscus cannabinus* seeds infected with *Colletotrichum hibisci* was obtained by soaking them in water at 20°C for 12 hr. followed by hot-water treatment at 50°C for 15 min or 52°C for 10 min. The correct seed moisture-content (about 40%) was obtained by this presoaking treatment. Variations in the rate of water absorption, and hence seed moisture-content, which arise from time and method of harvesting, storage conditions and exposure to direct sunlight before treatment, are reduced by the presoaking period of 12 hr. F. Eng. s.—D.B.

SUNNHEMP

367 Ranjan, S. and Budhraja, Bimla. **A study of nitrogen fixation in the detached root nodules of sunnhemp [*Crotalaria juncea*].** *Proc. Nat. Inst. Sci. India* 1959, **25,** Part B, No. 1, 39–43, bibl. 3. [Allahabad Univ. (S.R.); and Govt. Coll. Women, Ludhiana (B.B.)]

Only nodules remaining attached to the plant roots were able to fix atmospheric N. F. s.—D.B.

OIL CROPS

SESAME

368 Il'ina, A. I. **Response of sesame to intensity of light.** [Russian] *Fiziol. Rast. (Pl. Physiol., USSR)* 1959, **6,** No. 3, 263–73, bibl. 33, illus., English summary. [All-Union Sci. Res. Inst. Oil Crops, Krasnodar]

By using light of different intensities (from 6·8 to 52·4 thousand lux) an attempt was made to determine the basic causes of changes, induced by varying light intensity, in the economic characteristics of *Sesamum indicum*. From a study of the variety VNIIMK78 it is shown that temporary darkening at early phases (beginning with differentiation of the growing point to the formation of pollen tetrads) has a beneficial effect on plant productivity. Temporary darkening during formation of the flower organs, seeds and capsules has an adverse effect on plant growth and inhibits oil accumulation to the same extent as does permanent darkening. The oil content of seeds decreases with increase in the duration of darkness. The greatest reduction was observed when the plants were darkened at the stage of highest sensitivity to light, i.e. at the initiation of the primordial buds and up to the formation of pollen tetrads : at a light intensity of 28·4 thousand lux the oil content increased by 3% and was maximal; a decrease of illumination to 6·8 thousand lux reduced the oil content by 7·8%.—M.H.

SUNFLOWER

See also Abs. 384, 488

369 Forage Notes. **Advent sunflower.** *Forage Notes* 1959, **5,** No. 1, 38.

Advent (*Helianthus annuus*) is an Advance-type hybrid (5–37–388RR × Sunrise) resistant to sunflower rust [*Puccinia helianthi*]. Apart from its somewhat higher seed yields, it is very similar to Advance.—R.B.

370 Popov, P. S. [**The accumulation of phosphorus compounds in sunflower during ripening.**] [Russian] *Doklady Vsesojuz. Akad. S-H. Nauk (Proc. Lenin Acad. Agric. Sci.)* 1959, **24,** No. 7, 12–17. [Alekseevsk Zonal Exp. Sta.]

RAPE

371 Nordestgård, A. Forsøg med stammer af vinterraps 1950–1957. **Varietal trials of rape 1950-7.** *Ber. 579 Stat. Forsøgsvirk. Plantekult.* [contained in] *Tidsskr. Planteavl* 1959, **63,** No. 1, 125–35.

Yields, crude-fat and protein contents of the following varieties of rape [*B. napus* v. *oleifera*] are

tabulated : Svalöf Matador, Hammenhög Regal, Svalöf Matador C and Lembkes. Matador C gave a crude-fat yield of 894 kg/ha compared with 844 for Lembke, 885 for Regal and 871 for Matador.—S.M.J.

372 Crowle, W. L. **Influence of fertilizer on the germination of rape in the greenhouse.** *Forage Notes* 1959, **5**, No. 1, 34–5.

In glasshouse tests, mixing oil-rape seed with high rates of ammonium phosphate before sowing seriously reduced stands and resulted in delayed, uneven emergence. Polish rape was more susceptible than Argentine rape. Similar results were obtained in field trials, but stands were reduced to a greater extent than yields.—R.B.

CRAMBE ABYSSINICA

373 Graščenkov, A. E. [**Experimental study of *Crambe abyssinica* Hochst., a new oil plant in the Leningrad Province.**] [Russian] *Bot. Ž., SSSR* (*Bot. J., USSR*) 1959, **44**, No. 4, 536–43, bibl. 10, illus. [Komarov Bot. Inst., Leningrad]

This species was first grown as a crop in the USSR during 1933–4 at the Voronež Botanical Station. Subsequently it has been tested in various regions of the Soviet Union including the Leningrad Province and the Karel' Isthmus. The studies have been concerned with the plant's biology, its cultivation and the properties of its oil. The crop grows well on most soils, except heavy clay or powdery types. Its vegetative period in the Leningrad area is 81 to 114 days, depending on sowing date and climatic factors. Under favourable temperatures (e.g. as in 1953 and 1955) the seed ripens fully when the crop is sown on 25 May. Under a suitable environment the plant attains a height of 150 cm. and a 3-yr average seed yield = 1634 kg/ha. Harvesting is usually completed by the end of Sept. There is information on (1) oil content of the seed, comparison being made with that of other oil seeds ; and (2) the relation between oil content of the seed, rainfall during the ripening period, and summation of temperatures from May to October. [See also *Fld Crop Abstr.* 11 : 320]—M.H.

MUSTARD

374 Singh, D. and Singh, D. N. **Irrigation and manurial studies with early and late varieties of rape and mustard.** *Indian Oilseeds J.* 1959, **3**, No. 2, 109–20. [Dept. Agric., Uttar Pradesh]

From results of experiments near Kanpur the responses of early and late varieties of yellow sarson (*Brassica campestris*) and rai (*B. juncea*) to irrigation and N manuring (separately and together) in favourable and unfavourable years were tabulated. Rai benefited more from these treatments than did yellow sarson.—D.B.

375 Maini, S. N. and others. **Response of some *Brassica* crops to nitrogenous manures in the Punjab.** *Indian Oilseeds J.* 1959, **3**, No. 2, 105–8, bibl. 3. [Dept. Agric., Punjab]

$(NH_4)_2SO_4$ at 30, 60 and 90 lb. N/ac. was drilled into the soil to a depth of 3–4 in. before sowing certain *Brassica* spp. The preceding crop (wheat) and all cultural operations were common to all experimental plots and were those normally practised in the area. Taking into consideration the cost of fertilizing, the seed yields and the market value of the seed, the optimum doses of N per acre at Gurgaon near Delhi for raya (*B. juncea*), brown sarson (*B. campestris*) and toria (*B. campestris*) were 82, 59 and 24 lb. respectively. The N requirement was related to the length of the growing period.—D.B.

LALLEMANTIA

376 Sinskaja, E. N. [**The phenological spectra of winter forms of *Lallemantia* and *Camelina*.**] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1959, **128**, No. 4, 847–9. [All-Union Inst. Pl. Industry]

Seed of a wild winter form of *L. rupestris* was collected in the Tokai [?] district of Armenia [approx. 45°E. 40°N.] from 2 populations growing on the steep dry banks of the river Zanga, and from a 3rd population on a nearby area. The seed was sown in the autumn of 1956, separately on 3 plots for the 3 populations, respectively, at the Krasnodar Institute [39°E., 45°N.], and phenological records were made for individual plants in 1957. The flowering period of all the plants in plots 1 and 2 lasted for 10 days and in plot 3 for 14 days. In the autumn of 1957 the seeds from plants which flowered simultaneously were sown in the separate groups, similarly to the 1956 sowing, and observations were made in 1958 on flowering time for the individual plants. The populations from the first 2 areas flowered almost at the same time, the mean being 11 May. The population from the 3rd locality was later in maturing, flowering among the individual plants varying between 1 and 8 days (average date 13 May). These features differ from those observed for *Camelina* populations obtained from the Orenburg [Čkalov] Province [55°E., 52°N.] and tested at Krasnodar. The *Camelina* populations are more complex in biotypic composition, flowering time ranging over 30 days in different individuals during 1957 and over 26 days in 1958. The shortest period in 1957 was 12 days, but the majority flowered within a 20-day range. A study of populations in this way determines the minimum area of natural distribution of a species.—M.H.

CROP BOTANY

PHYSIOLOGY

See also Abs. 302, 304, 359.

377 Tarčevskiĭ, I. A. [**The effect of drought on the formation of photosynthetic products.**] [Russian] *Bot. Ž., SSSR* (*Bot. J., USSR*) 1959, **44**, No. 4, 513–16, bibl. 21. [Kazan State Univ.]

The study was made with leaves of *Triticum vulgare* var. Hordeïform 496 using radioactive carbon (^{14}C) and paper chromatography. There is information from a 6–8 replicated test on the effect of soil- and atmospheric-drought on the amount of ^{14}C included in alanine and protein of the leaves during 5 minutes of photosynthesis. The more rapid accumulation of the labelled element in alanine than in protein of the leaves under drought conditions is demonstrated in the plants at the tillering, shooting and flowering stages.—M.H.

378† Kolesnikov, P. A. [**The interrelationship between respiration and photosynthesis.**] [Russian] *Usp. Sovrem. Biol.* (*Adv. mod. Biol., Moscow*) 1959, **47**, No. 3, 362–74, bibl. 55.

A review article.

379† de Wit, C. T. **Transpiration and crop yields.** *Versl. Landbouwk. Onderz. 64.6* 1958, pp. 88, bibl. 82. [Inst. Biol. Chem. Res. Fld Crops Herb., Wageningen]

The following aspects are studied : fundamental considerations (transpiration and assimilation of leaves, plants and crops and the ratio between transpiration and assimilation), transpiration and plant growth in containers and in the field. It was shown that the relationship between transpiration and total dry-matter production in containers was much less affected by growing conditions than is generally supposed. In semi-arid and arid regions of the USA this relationship appeared to depend mainly on plant species and free water evaporation ; in cloudy regions such as the Netherlands it depended mainly on plant species. Soil fertility and availability of water appear to be of secondary importance. This difference between plant growth in the Netherlands and in the USA was due to differences in light intensity. Under field conditions the relation between transpiration and total dry-matter production must often be the same as for plants in containers, provided the dry-matter production under field conditions is limited by the availability of water. Where this is not the case, transpiration tends to be higher. Difficulties were met in dealing with the interrelation between drought resistance and transpiration-production relationships and with the contribution of advective energy to transpiration. The relationship between transpiration and total dry-matter production is not affected by the ability of the plant to withstand periods of drought, but the amount of marketable product and the total amount of water transpired during the growing period may largely depend on this ability. In the field, advective energy may supply much of the heat necessary to vaporize the water transpired. On the other hand, there must be and are fields where this is not the case, and where transpiration may be lower than that calculated from production-transpiration equations for plants grown in containers. F. S.—G.M.R.

380† Wiklert, P. Vissningsgränsen. **The wilting point.** *Grundförbättring* 1958, **11**, No. 1, 9–25, bibl. 47, illus. [Inst. Agron. Hydrotek., K. LantbrHögsk., Uppsala, Sweden]

The results are given of studies of different stages of wilting in plants from the point of view of the soil moisture contents at which wilting occurs and their determination. Definitions are given of : (a) temporary wilting, (b) the first permanent wilting point, (c) the ultimate wilting point, and (d) the permanent wilting range. Term (b) is defined as the soil moisture content at which plants first show signs of losing turgor without being able to regain it when placed in 100% RH, but can do so when water is added to the soil. Term (c) is defined as the soil moisture content at which the whole plant loses its turgor without being able to regain it when placed in 100% RH, but can do so partly or entirely when water is added to the soil. Term (d) is defined as the range between (b) and (c). It is considered that the term wilting point should be defined as (b). Methods for determining the wilting coefficient of soils are described, with particular reference to the method evolved at the Institute of Agricultural Hydrotechnics, in which indicator crops are used.—P.J.B.

381† Virtanen, A. I. **Aspects on antimicrobial substances in cultivated plants.** *Atti Ist. bot., Univ. Pavia Ser. 5* 1959, **16**, 162–79, bibl. 36. [Biochem. Inst., Helsinki, Finland]

382 Kamata, E. **Morphological and physiological studies on nodule formation in leguminous crops. 5. On the determination of location for nodule formation.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 245–8, bibl. 8, English summary. [Fac. Agric., Univ. Tokyo]

The reason why nodule formation is usually

limited to the basal region of the root or rootlet was investigated histologically and chemically in 48 varieties of 19 species of Leguminosae grown under various conditions of N supply and shading. The basal portion of the root or rootlet had the highest concentration of sugars utilizable for growth of nodule bacteria. F. Eng. s.—D.B.

GROWTH AND REPRODUCTION

See also Abs. 125, 170, 345, 515.

383† Bray, J. R. and others. **Primary production in some Minnesota terrestrial communities for 1957.** *Oikos* 1959, **10**, No. 1, 38–49, bibl. 13. [Univ. Toronto, Ontario]

Determinations were made of the total amount of organic matter produced by a number of natural and managed plant communities, including maize and rye crops, marshland communities and native and managed upland grassland in north and central Minnesota. For those species whose production of roots and above-ground parts it was possible to determine, yearly increments of organic matter ranged from 6300 kg/ha for *Zizania aquatica* to 13,900 kg/ha for maize. Increments for above-ground parts, only, ranged from 1200 kg/ha for *Setaria glauca* to 16,800 kg/ha for *Typha* spp. The efficiency of yearly production of organic matter in relation to total incoming solar radiation ranged from 0·04 + % for *Setaria glauca* and *Aristida basiramea*, to 0·53 + % for *Typha angustifolia* × *T. latifolia* hybrid. The efficiency of maize receiving fertilizer was 0·43%.—P.J.B.

384 Wilson, G. L. **Further experiments on the influence of light intensity on the growth of the sunflower (*Helianthus annuus*), with a discussion of some pot culture difficulties and possible shortcomings of growth analysis comparisons.** *Pap. Qd Univ. Dep. Bot.* 1958, **3**, 223–45 [Bot. Dep. Univ. Queensland, Brisbane]

As a further test of the generality of relationships between growth components and relative light intensity which had been determined in southern England, sunflowers were grown at a range of intensities in experiments carried out at intervals over 3 years. The results generally follow the findings of comparable experiments with this species in the higher latitudes, except that the rate of growth appears to be limited by light throughout the year, while the consistent logarithmic relationships between growth analysis components and light intensity do not hold. Clear seasonal trends of growth components are shown. Emphasis is given to possible limitations of the technique of growth analysis, particularly when used for comparisons between plants subjected to different treatments. Certain problems of pot culture are discussed and it is thought that the restrictive effects which may accompany growth in pots could lead to erroneous conclusions. F. s.—C.L.S.

GROWTH SUBSTANCES

See also Abs. 262, 298, 299, 312.

385† van Overbeek, J. **Auxins.** *Bot. Rev.* 1959, **25**, No. 2, 269–350, bibl. 312, illus. [Shell Devel. Co. Agric. Res. Div., Modesto, California]

This is a comprehensive review of the structure and mode of action of natural and synthetic growth-regulating substances.—R.B.

386 Tomita, T. **Auxins in diffusate obtained from vernalized winter rye.** *Tohoku J. agric. Res.* 1958, **9**, No. 2, 63–7, bibl. 3, illus. [Tohoku Univ., Sendai, Japan]

The diffusate from vernalized winter-rye seeds which promoted heading in wheat, rye and meadow grass (*Poa annua*) was shown, by paper chromatography and absorption spectrography, to contain an auxin which was neither IAA nor NAA. The method by which the diffusate was collected is described. See also *Fld Crop Abstr.* 10 : 444. F. s.—D.B.

387 Clor, M. A. and others. **Growth responses resulting from gibberellic acid and 2,4-D interaction.** *Bot. Gaz.* 1958, **120**, No. 2, 80–7, bibl. 17, illus. [Univ. California, Davis]

Seedlings of cotton, at the cotyledonary stage, were treated, with 50, 100 or 200 μg GA, and with 0·1, 1 or 10 μg 2,4-D either on the same day as the GA was applied or 3 days later. The highest rate of 2,4-D prevented further seedling growth. 2,4-D at 1μg per seedling had a synergistic action on shoot elongation, proportional to the concentration of GA applied. The amount of shoot elongation was greater when the application of 2,4-D was delayed for 3 days. 2,4-D at 0·1 μg exhibited a slight, but non-significant, synergism with GA. GA had no modifying influence on leaf distortion caused by 2,4-D.—R.B.

388 Ishihara, A. **The effect of gibberellin on the spike initiation in wheat plants.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 285–8, bibl. 5, illus., English summary. [Fac. Agric., Univ. Tokyo]

Repeated spraying with gibberellin solution (which can be done at warm temperatures) was able to replace low-temperature vernalization. It stimulated the differentiation of flower primordia. F. Eng. s.—D.B.

389 Moore, T. C. and Bonde, E. K. **Interaction of gibberellic acid and vernalization in the dwarf Telephone pea.** *Physiol. Plant.* 1958, **11**, No. 4, 752–9, bibl. 12, illus. [Univ. Colorado, Boulder]

Imbibed seed of dwarf peas, *Pisum sativum* var. Telephone, was subjected to the following treat-

ments : (a) no treatment, (b) soaked for 6 hr in a solution of 1·5 mg GA/l., (c) vernalized for 10, 20 or 30 days at 4–5°C., (d) as (c) but the seed soaked in GA solution before cold treatment, (e) as (c), but seedlings sprayed with GA 9 days after cold treatment. Plants were vegetatively vernalized (defined as the inductive effect of cold treatment on vegetative development) by cold treatment for 10 days with or without GA application and by cold treatment for 20 or 30 days, where followed by GA treatment. Reproductive vernalization (defined as the inductive effect of cold treatment on flowering) occurred in plants subjected to cold treatment for 20 or 30 days, but not in plants treated for 10 days. GA applied after the cold treatments completely reversed the reproductive vernalization effect; GA applied before cold treatment did so only partially. It appeared that GA was able to inhibit the effect of vernalization on flowering, but at the same time it stimulated the elongation of shoot cells and GA, applied after cold treatment, exercised the same devernalizing effect as heat treatment.—P.J.B.

390 Audus, L. J. and Gunning, B. E. S. **Growth substances in the roots of *Pisum sativum*.** *Physiol. Plant* 1958, **11**, No. 4, 685–97, bibl. 29. [Bedford Coll., Univ. London]

NUTRITION

See also Abs. 178, 265.

391 Wiersum, L. K. and Bakema, K. **Competitive adaptation of the cation exchange capacity of roots.** *Plant and Soil* 1959, **11**, No. 3, 287–92, bibl. 20, illus. [Inst. Soil Fertility, Gröningen, Netherlands]

Wheat, pea (*Pisum sativum*) and broad bean (*Vicia faba*) plants were grown in vessels each divided transversely by a partition, so that part of the root system grew in a mixture of sand and (a) cation-exchange resin, and part grew in a mixture of sand and (b) anion-exchange resin. Resin (a) was previously saturated with cations from Hoagland's solution, or with Ca or Mg, resin (b) with anions from Hoagland's solution, dihydrogen phosphate or sulphate. After a few weeks' growth, roots from each side of the partition were tested for cation exchange capacity. All plants except broad beans produced roots with a higher cation exchange capacity in the medium containing cations than in that containing anions. It was concluded that a competitive adaptation of root cation exchange capacity had occurred in relation to the medium in which the roots were growing. The results lent support to the theory that the level of root cation exchange capacity has a regulating influence on the uptake of monovalent and divalent ions.—R.B.

392 Wahhab, A. and others. **Salt tolerance of various varieties of agricultural crops at germination stage.** *Pakistan J. sci. Res.* 1959, **11**, No. 2, 71–80, bibl. 13. [Agric. Coll., Lyallpur, W. Pakistan]

The percentage germination of seeds of crop plants grown under a range of conditions is shown in diagrams and tables. The conditions were : soil moisture 15–90%, and NaCl concentrations 0·03% (the original soil) and 0·1 – 0·6 %. The crops were wheat, maize, barley, gram (*Cicer arietinum*), rice and cotton, and the varieties selected for study were those recommended for saline soils of W. Pakistan.—D.B.

393 Avdonin, N. S. and Kolosova, N. A. [**A direct effect on plants of the pH of the medium in which they are grown.**] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1959, **127**, No. 5, 1136–9, bibl. 5.

A 2-yr study with barley and spring wheat was made, using (1) the isolation method of culture (by which one half of the root system is grown in one solution and the other half in another), and (2) periodic nutrition, by which the plants are grown in a normal nutrient solution (Avdonin's mixture) and transferred, periodically, for 24 hr to distilled water of specific reaction. The data from (1) show that a change in pH of the water from 4 to 6 increases the total mass of barley plants by 26·4% and grain yield by 52%. With spring wheat, a change in pH of the water from 4·5 to 6·5 increases the total mass by 70·6% and grain yield by 133·6%. The data from (2) are similar. There is also evidence that an acid medium induces the accumulation of a large amount of monosaccharides, while their conversion to disaccharides and other more complex compounds is retarded. An acid medium also suppresses the formation of proteins in the plants ; for example, protein-N in the leaves of barley was 3·65% (on a dry-matter basis) with pH 4·5, and 4·13% with pH6. In the stems the corresponding figures were 1·78 and 2·01%.—M.H.

394 Wybenga, J. M. **Sodium, an essential nutrient for the plant.** *Information, Nitrate Corp. Chile Ltd.* 1959, pp. 7, bibl. 17. [Pl. Nutr. Res. Lab., Chilean Nitrate Agric. Serv., Wageningen, Netherlands]

Autoradiographic studies with ^{22}Na in a variety of crop plants showed that : the distribution of Na within plants depends on the species, during germination most of the Na in the seed is translocated to the roots, and Na is accumulated mainly in rapidly-dividing meristematic tissues. Na is accumulated in nodes of oats, heads of flax, in root nodules of peas, and at points where side roots originate. Field experiments with fodder-beet indicated that nitrate of soda resulted in higher yields than did equivalent quantities of Na-free N fertilizer, at levels of K up to 800 kg of 40% K fertilizer/ha. Similar results were obtained

with sugar-beet, though its Na requirement is less than that of fodder-beet.—R.B.

395 Olsen, C. **Iron uptake in different plant species as a function of the pH value of the nutrient solution.** *Physiol Plant.* 1958, **11**, No. 4, 889–905, bibl. 14, illus. [Carlsberg Lab., Copenhagen]

The results are presented of experiments with *Deschampsia flexuosa*, *Cannabis sativa* and *Sinapis alba*.—P.J.B.

CHEMICAL ANALYSES AND COMPOSITION

396† Young, R. S. El cobalto en biología y bioquímica. [**Cobalt in biology and biochemistry.**] *Cienc. e Invest.* 1958, **14**, No. 2, 51–65, bibl. 112. [Internat. Nickel Co., Canada]

A section of this review (translated from *Science Progress* 1956, 44, No. 16) is concerned with cobalt in plants. A table, compiled from the literature, shows the cobalt content of many food and forage plants.—E.B.O.

397 Smith, C. R. and others. **Comparison of solubility characteristics of selected seed proteins.** *J. agric. fd Chem.* 1959, **7**, No. 2, 133–6, bibl. 18. [Agric. Res. Serv., U.S. Dep. Agric., Peoria, Ill.]

A table gives botanical and common names, also the protein content of the seed, of many species, including soyabean, wheat, maize, safflower, niger (*Guizotia abyssinica*), flax, beet, buckwheat, kenaf and cotton.—E.B.O.

TECHNIQUES AND APPARATUS

398† Alekseenko, L. N. [**Method for determining leaf area of herbage plants.**] [Russian] *Doklady Vsesojuz. Akad. S-H. Nauk* (*Proc. Lenin Acad. Agric. Sci.*) 1959, **24**, No. 9, 27–8. [Leningrad Agric. Inst.]

The method described is based on the assumption that the area of 1 g of the crude leaf (or of 1 g of leaf in an air-dry condition) is constant for a given species. This assumption is substantiated as follows. In each herbage species the area is determined (11 to 35 times) of 1 g of the crude or dry leaves at different stages of plant development. Whole plants from the experimental plots are cut and all the green leaves are quickly removed, weighed and imprinted on light-sensitive paper which, after being developed, shows the leaves in clear contour. These contours are cut from the prints and weighed, comparison being made with the weight of 100 cm^2 of paper. Thus the area of leaves in a given sample is determined and the number of sq. cm in 1 g crude leaf is calculated. At the stage of maximum development, the leaf area per 1 m^2 of soil calculated by this method is (in m^2) : for *Phleum pratense* 4·85 ; for *Festuca pratensis* 4·88 ; *Dactylis glomerata* 10·62 ; *Bromus inermis* 12 ; *Trifolium pratense* 9·68 ; and *Medicago sativa* 17·5. To determine the accuracy of this coefficient (i.e. leaf area in cm^2 as derived from 1 g of the leaf's crude or dry weight), the data have been statistically analysed and this shows that the percentage error does not exceed 2·15. It is concluded that utilizing this coefficient as obtained for conditions in the N.W. zone of USSR, or determining it by this method for plants grown in other climatic conditions, is a quick process (with an accuracy within 1·5 to 2% in field conditions) by which crude weight of the leaves can be used to determine leaf area. To relate leaf area with a unit of soil surface, the leaf weight is considered with any given area of soil.—M.H.

399 El'piner, I. E. and Bronskaja, L. M. [**Some physico-chemical origins of the stimulating action of ultra-sonic waves on the germination of maize grain.**] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1959, **128**, No. 5, 1073–5, bibl. 6, illus. [Inst. Biol. Physics, Acad. Sci. USSR]

Former studies have shown that ultrasonic waves, under certain conditions, produce in living bodies a reversal of their physical/chemical processes, especially in the functions of cellular walls and membranes. It has been claimed that the waves impair membrane permeability and dislocate the physical and chemical status of macromolecular complexes arising in the sub-microscopic structure of epidermal cells. This is expressed by the increase in the activity of enzymes in the epidermal cells, by changes in their electrokinetic potential, and by increased sensitivity of the treated cells to the influence of many biologically active substances. In the present work data are given which show that ultrasonic radiation causes " shattering" in the sub-microscopical structures of the seed coat and influences the fermentative activity of these structures. The work was carried out with maize grain of the varieties Sterling, North Dakota and VIR-2. The macroscopic state of the grain was observed in the first few days of growth and polarographic determination was made (by a modification of the method recorded in *Anal. Chem.* 1949, 21, No. 7/8, p. 763) of the kinetics of the formation of peroxide compounds in different parts of the seed (embryo, endosperm, scutellum). There is evidence that under conditions of the test, ultrasonic waves increase the amount of peroxide compounds in the grain and accelerate the rate of swelling in seeds soaked in water. It is concluded that the stimulation of maize grain development is conditioned by the biochemical processes (determined directly by the duration of subjection to ultrasonic waves) in which oxygen plays an active role.—M.H.

400† Lieshout, J. W. van. De toepassing van radioactieve isotopen, in het bijzonder van P^{32}, bij het wortelonderzoek. [**The use of radioactive isotopes, especially ^{32}P, in root studies**] *Landbouwk. Tijdschr., Wageningen* 1959, **71**, No. 1, 22–9. [Lab. Crop Prod., Agric. Univ. Wageningen]

An outline is given of ways in which isotopes, especially ^{32}P, can be used in root studies. By accurately localizing in the soil a known quantity of ^{32}P and periodically measuring its uptake by the plant, a measure is given of the growth and activity of the roots.—G.M.R.

401 Aytoun, R. S. C. and others. **A biological assay for gibberellic acid with rice seedlings.** *Analyst. Lond.* 1959, **84**, No. 997, 216–21, bibl. 12. [Glaxo Laboratories Ltd., Sefton Park, Stoke Poges, Bucks, England.]

A convenient laboratory method for the quantitative bioassay of GA, using rice seedlings, is described. The statistical aspects are discussed. F. a. s.—P.J.B.

RADIOBIOLOGY

See also Abs. 311.

402 Bowen, H. J. M. **The use of radioactive isotopes. 3. Inorganic isotopes in agriculture and biology.** *Research appl. Industr., Lond*, **12**, June 1959, 226–31, illus., bibl. 73.

Some applications and possible uses of inorganic isotopes in agriculture are reviewed, with special reference to plant nutrient and fertilizer studies.—S.M.J.

403† Barbier, G. and others. Sur la prévision de l'accumulation, dans le sol et dans les récoltes, d'éléments radioactifs de longue période apportés indéfiniment à un rythme limité. [**On forecasting the accumulation, in soil and crops, of radioactive, long-period elements deposited indefinitely with a limited rhythm.**] *C.R. Acad. Agric. Fr.* 1958, **44**, No. 18, 874–80, bibl. 3.

Trials to study the contamination of crops by radioactive elements were started in France 2·5 years ago in a joint programme of work of the Institut National de la Recherche Agronomique and the Commissariat à l'Énergie Atomique. From glasshouse trials with rice, the main conclusion was that the above-ground parts of rice absorb less than 3% of the radioactive fission products carried by irrigation water. The object of this article was to define a method for anticipating the course of accumulation of radioactive elements in crops and soils, on the basis of their spontaneous decrease in radioactivity and of results from cultural trials, on the assumption that there is a continuous deposition of the element. Cultural trials must be carried out for a number of years with different crops and different soils in order to determine the value of the following coefficient : c=quantity of radioactive element absorbed by a unit of harvested product/quantity of radioactive element present in a unit of soil. The determination of this coefficient (which varies with crops and soils) will enable the course of accumulation of a radioactive element in crops to be determined on the basis of the quantity accumulated in the soil.—E.B.O.

404 Lee, C. C. **Distribution of radioactivity in wheat plants grown in the presence of strontium - 90.** *Science* 1959, **129**, No. 3358, 1280, bibl. 3. [Univ. Saskatchewan, Saskatoon]

In glasshouse trials, individual wheat plants, var. Thatcher, were grown in pots each containing 450 g soil kept at 35% moisture content throughout the growing period. A solution of 0·1 g $SrCl_2 \cdot 6H_2O$/l. containing ^{90}Sr, giving $2{\cdot}5 \times 10^6$ counts/min./ml, was added to the soil in the following quantities : 1 or 2 ml. 73 days before harvest ; 3 ml, at 44 or 29 days before harvest. Plants were harvested at maturity and separated into leaves, stems, ears and grain. The quantity of ^{90}Sr in the grain ranged from $1{\cdot}1 \times 10^{-5}$ to $2{\cdot}9 \times 10^{-5}$ of the amount added to the soil ; the leaves and stems contained about 10 times more ^{90}Sr than the grain. —R.B.

405† Sparrow, A. H. and others. **Bibliography on the effects of ionizing radiation on plants : 1896-1955.** *Off. Tech. Serv. U.S. Dep. Comm., Washington* 1958, pp. 222. [Seen in *Month. Bull, sci. Doc. Term. UNESCO* 1958, 15 Dec.]

406 D'Amato, F. Fasciazioni caulinari e fiorali, sterilità ed altre modificazioni di sviluppo indotte dalla irradiazione cronica gamma da radiocobalto nel lino. [**Stem and flower fasciations, sterility and other developmental changes induced in oil-seed flax by chronic gamma irradiation from radiocobalt.**] *Nuovo G. bot. ital.* 1957, **64**, No. 1–2, 1–18, bibl. 36, illus., English summary. [Brookhaven Nat. Lab., USA] [Received Oct., 1959]

MISCELLANEOUS

407† Department of Scientific and Industrial Research, New Zealand. **Botany Division.** *Rep. Dep. Sci. Industr. Res.* 1959, 50–2.

The projects being studied are listed under sections which include : Botanic Garden ; taxonomic studies ; vegetation studies. A list is also appended of works which have been published on results of these projects.—M.H.

408† Barrau, J. **A reconnaissance survey in the field of economic botany in western**

Melanesia. 1958, pp. 60. [S. Pacif. Comm., Noumea, New Caledonia]

This is a report on a visit to Netherlands New Guinea, the Territory of Papua and New Guinea and the British Solomon Islands Protectorate during 31 Jan.–23 Apr., 1958, with the main object of preparing an inventory of the economic plants and a running inventory of new introductions and newly-released selections in these territories. It is thought that western Melanesia, particularly New Guinea, is of great importance for plant collection and introduction because of the numerous economic plants present in the native flora and others which have been introduced during the pre-European and European eras. The species which are considered to merit study include *Ipomoea batatas*, *Psophocarpus tetragonolobus* and *Colocasia esculenta*. —E.B.O.

WEEDS AND WEED CONTROL

Where weeds are specific to a crop, see under the crop concerned. See also Abs. 530.

409† Fail, H. **Mechanical eradication of couch and twitch.** *World Crops*, 1959, **2**, No. 7, 241–4.

Areas of farmland in Northumberland were completely cleared of couch (*Agropyron repens*) and twitch (*Agrostis* spp.) by four successive rotavations, at intervals of about 21 days, so as to cut the rhizomes into successively shorter lengths, so that they died from desiccation and exhaustion of reserves.—S.M.J.

410 Buchholz, K. P. **Variations in the sensitivity of clones of quackgrass to dalapon.** *Proc. 15th N. Cent. Weed Contr. Conf.* [USA] 1958, 18–19. [Univ. Wisconsin, Madison]

The results from glasshouse trials with clones of *Agropyron repens* (collected from different localities in Wisconsin) showed that there were significant differences in their response to dalapon.—P.J.B.

411 Black, M. **Dormancy studies in seed of *Avena fatua*. 1. The possible role of germination inhibitors.** *Canad. J. Bot.* 1959, **37**, No. 3, 393–402, bibl. 9. [Univ. Saskatchewan, Saskatoon]

Chromatography of aqueous extracts of hulls and caryopses of *Avena fatua* showed the presence of 2 germination inhibitors which occurred in these tissues in approximately equal amounts per unit weight of tissue. These inhibitors readily diffused from caryopses placed on moist filter paper. The presence of hulls appeared to retard the leaching of these substances from caryopses. Treatment with high concentrations of O_2 reduced dormancy and appeared to reduce the level of inhibitor present in the seed before visible signs of germination were evident. Anaerobic conditions caused secondary dormancy and a marked increase in the content of total inhibitors in the caryopses. F. s.—R.B.

412 Saidak, W. J. **Studies on the absorption and translocation of dalapon in northern nutgrass (*Cyperus esculentus* L.).** *Diss. Abstr.* 1959, **19**, No. 10, 2419–20. [Cornell Univ., Ithaca, New York State]

The results of studies on the translocation of radioactive dalapon within nutgrass plants showed that dalapon, absorbed by roots or leaves, was not translocated to any appreciable extent to the tubers. It was concluded that differences in the extent of translocation of dalapon to the tubers was not the main cause of variability in the control of nutgrass by this herbicide in the field.—P.J.B.

413 Palmer, R. D. **The metabolism of tubers of *Cyperus rotundus* L. as influenced by oxygen levels and 3-amino-1,2,4-triazole.** *Diss Abstr.* 1959, **19**, No. 12, 3098. [Louisiana State Univ., Baton Rouge]

414 Wassberg, C. **A study of the growth effects produced by 2,4-D in the flower and fruits of *Datura stramonium* and *Datura tatula*.** *Diss. Abstr.* 1959, **19**, No. 12, 3105 [Univ. Washington, Saint Louis 5, Missouri]

415 Derscheid, L. A. **Russian knapweed — difficult, but not impossible, to eliminate.** *S. Dak. Fm Home Res.* 1958, **9**, No. 3, 16–23, illus.

Land in Spink County, S. Dak., infested with *Centaurea repens* was sown to winter rye in September 1952. Early spraying with 1 lb. 2,4-D ester/ac., just before the boot stage, plus late spraying with 1·5 lb./ac. in the stubble in mid-Aug., gave 91% control. Late spraying gave 89% control, early spraying followed by 2 cultivations after harvest gave 71% control, and 2 cultivations alone, after harvest gave 63% control. Early spraying did not kill many weeds, but prevented seed production. In 1954, early spraying of oats followed by 3 autumn cultivations or late spraying, or late spraying of rye, increased weed control on all plots to 90%. In 1955, 95% control was achieved on

plots sprayed in the previous autumn, cultivated 3 times in the spring and sown to Sudan grass [*Sorghum sudanense*]. Cultivation 7 times at 3-week intervals throughout the growing season gave 97% control, as did more frequent cultivation. Cultivation for a second season gave little further control. Small patches of knapweed were most consistently eliminated by soil sterilants containing $NaClO_3$.—R.B.

416† Berg, A. Analyse des conditions impropres au développement de la jacinthe d'eau (*Eichhornia crassipes*) (Mart.) Solms dans certaines rivières de la cuvette congolaise. [**Analysis of the conditions unsuitable for the development of water hyacinth (*E. crassipes*) in certain rivers of the Congo basin.**] *Bull. agric. Congo belge* 1959, **50**, No. 2, 365–93, bibl. 6, illus., Flemish summary. [Div. Hydrobiol. INÉAC, Yangambi, Belgian Congo]

The exploration of the River Congo and its tributaries between Mokweti and Coquilhatville showed that conditions in most of these rivers are unsuitable for the development of water hyacinth. From the study of this phenomenon it was concluded that water hyacinth does not grow in water with a pH value constantly lower than 4·2.—E.B.O.

417† Cooreman, J. *Tetranychus telarius* (Linné) (Acari, Tetranychidae) parasite de la jacinthe d'eau (*Eichhornia crassipes*) Mart. [***T. telarius* (Acari, Tetranychidae) a parasite of water hyacinth (*E. crassipes*).**] *Bull. agric. Congo belge* 1959, **50**, No. 2, 395–401, bibl. 10, illus., Flemish summary. [Inst. Roy. Sci. Nat. Belgique]

It is thought that *T. telarius*, which severely damaged plants of water hyacinth grown in laboratory aquariums in Belgium, could be used for the biological control of this weed in the Belgian Congo.—E.B.O.

418† Department of Agriculture, Fiji. **A new weed recorded.** *Agric. J. Fiji* 1959, **29**, No. 1, 35.

Elephantopus spicatus, a declared noxious weed of W. Samoa, has been identified for the first time on Waya Island in the Yasawa Group. It is reputed to be more noxious than tobacco weed (*E. mollis*).—S.M.J.

419† Bakshi, T. and Coupland, R. T. **An anatomical study of the subterranean organs of *Euphorbia esula* in relation to its control.** *Canad. J. Bot.* 1959, **37**, No. 4, 613–20, bibl. 16, illus. [Univ. Saskatchewan, Saskatoon, Canada]

420 Forsberg, D. E. and Best, K. F. **Studies on the control of wild buckwheat.** *Proc. 15th N. Cent. Weed Contr. Conf.* [USA] 1958, 22. [Exp. Fm, Scott (D.E.F.) and Exp. Fm, Swift Current, (K.F.B.), Saskatchewan]

Studies indicated that the seed of *Fagopyrum tataricum* underwent a period of dormancy and would not germinate in soil under summer-fallow conditions. The seed germinated and emerged from depths of 4 in. in the soil. Most seed germinated in May and early June, and a proportion germinated in all months between June and Sept. A single healthy plant was able to produce about 4500 seeds in one season and seed could be produced on almost all above-ground parts of the plant. Best control followed the use of 2 applications of 5 oz. 2,4-D ester/ac, one week apart, the first application being given at an early growth stage.—P.J.B.

421† Doyon, D. Étude de la distribution géographique de l'asclépiade commune (*Asclepias syriaca* L.) en Amérique du Nord. [**Study of the geographical distribution of common milkweed (*A. syriaca*) in N. America.**] *Rep. Que. Soc. Protect. Pl. 1958*, 1959, **40**, 91–113, bibl. 55, illus., maps 8. [Div. Mauvaises Herbes, Min. Agric., Quebec]

The plant structure of *A. syriaca* is described and its distribution in N. America is given.—R.B.

422 Bianchi, D. E. and others. **Pollen release in the common ragweed (*Ambrosia artemisiifolia*).** *Bot. Gaz.* 1959, **120**, No. 4, 235–43, bibl. 17, illus. [Dep. Bot., Univ. Michigan, Ann Arbor]

423 Holz, W. Versuche mit Wuchsstoffkombinationen zur Dannessel- und Knöterichbekämpfung im Getreide. [**Trials with combinations of growth substances for the control of hemp nettle and persicaria.**] *Angew. Bot.* 1958, **32**, No. 3, 77–90, bibl. 2, illus. [Pflanzenschutzamt Oldenburg, W. Germany] [Received Nov. 1959]

The officially recommended formulation consisting of 20% 2,4,5-T ester and 20% MCPA ester sprayed at 1·5 l. in 600 l. water/ha was a good practical way of controlling *Galeopsis tetrahit* in cereals grown on a bog-peat soil. A combination of 10% 2,4,5-T ester + 30% MCPA ester was also satisfactory but weaker in its effect.—D.B.

424 Meadly, G. R. W. **Melilotus or King Island melilot (*Melilotus indica* All.).** *J. Agric. W. Aust.* 1959, **8**, No. 2, 161–3, illus.

M. indica is described and the manner in which the coumarin in its seed may taint grain is explained. It is recommended that cereal crops containing the weed should be sprayed with 2,4-D.—J.D.J.

425 Sifton, H. B. **The germination of light-sensitive seeds of *Typha latifolia* L.** *Canad. J. Bot.* 1959, **37**, No. 4, 719–39, bibl. 37, illus. [Dep. Bot., Univ. Toronto, Ontario]

The percentage germination of *Typha latifolia* seeds was greatly increased in the presence of white light, even of very low intensity and was highest at an oxygen concentration of 2%. The optimum temperature for seed germination was close to 30°C. The percentage germination in darkness was considerably increased by rupture of the seed coat. Blue light appeared to inhibit germination in both intact seed and in seed with ruptured seed coats. The effect of germinating conditions on percentage germination varied among seed samples.—R.B.

426 McMillan, C. **Salt tolerance within a *Typha* population.** *Amer. J. Bot.* 1959, **46**, No. 7, 521–6, bibl. 2, illus.

T. latifolia had a much greater tolerance to NaCl than had *T. angustifolia*, both in the field and in a glasshouse. The salt tolerance of hybrid clones was intermediate between the 2 spp. F. s.—R.B.

427 Lewis, J. **Longevity of crop and weed seeds. 1. First interim report.** *Proc. internat. Seed Test. Ass.* 1958, **23**, No. 2, 340–54, bibl. 22. [Welsh Pl. Breed. Sta., Aberystwyth]

The results are given of 4 years' investigations of the viability of the seed of 39 species and varieties of cereals, grasses, herbage legumes and weeds stored under dry conditions and then buried in the field at depths of 5, 10 or 15 in. in mineral and peat soils for periods up to 4 yr. The seed of cereals, particularly the cultivated types, was short-lived in soil. Wild oat seed had a germination of 1% after 4 years' storage in soil. Of the cereals, barley appeared least able to maintain its viability in soil and it was concluded that cereals were best grown for seed in fields previously under barley. Peat soils were more detrimental to seed viability than mineral soils. The results are also given of trials with herbage spp. In studies on 9 arable weeds, the seed of most spp. lost very little viability in mineral soils for 4 yr. *Geranium molle* and *G. dissectum* were exceptional in showing less than 1% viability after storage in soil for 4 yr. Except for *Plantago lanceolata* seed, which had a germination of 43% at the end of 4 yr storage, the remaining spp., including *Chenopodium album*, *Lychnis alba* [= *Melandrium album*], *Matricaria inodora*, *Rumex crispus*, *Polygonum persicaria* and *Ranunculus repens* all had low germination percentages and a high incidence of dormancy. Only *P. persicaria*, *R. repens* and *R. crispus* showed appreciable viability after storage for 4 yr. in peat. Under conditions of granary storage, viability was maintained well in all spp. for one year and fell rapidly after 2 years, except in the case of weed spp. Dry storage of the seed of all spp. at a temperature of 32°F. ± 2°F. maintained a high level of viability for several years.—P.J.B.

428 Derscheid, L. A. **Weather effects on pre-emergence applications of CDAA and simazin.** *Proc. 15th N. Cent. Weed Contr. Conf.* [USA] 1958, 23. [S. Dakota State Coll., Brookings]

In trials in S. Dakota during 1956–8, the effectiveness of CDAA against *Setaria* spp. in a number of crops varied widely as a result of fluctuations in temperature and rainfall after treatment. Cool, moist conditions at the time of treatment reduced the effectiveness of CDAA sprays ; with granular CDAA there was some evidence that the reverse was the case. With simazin, the weather before and at the time of application had little influence on its effectiveness against *Setaria* spp. Its effect was much enhanced where rain leached the herbicide into the soil after application.—P.J..B.

429 Schneider, E. O. **Simazin and related triazine herbicides.** *Proc. 15th N. Cent. Weed Contr. Conf.* [USA] 1958, 10–11. [Geigy Agricultural Chemicals, Yonkers, New York State]

A brief account is given of the herbicidal effects of simazin and other triazine compounds and of factors which influence their effectiveness in the field. A list is given of crops which show tolerance to these compounds.—P.J.B.

430 Schneider, E. O. **A progress report on the physiology of simazin in the corn [maize] plant.** *Proc. 15th N. Cent. Weed Contr. Conf.* [USA] 1958, 4. [Geigy Agricultural Chemicals, Yonkers, New York State]

431 Bondarenko, D. D. **Absorption and translocation of amitrol in corn [maize] and soybean plants.** *Proc. 15th N. Cent. Weed Contr. Conf.* [USA] 1958, 5. [Ohio Agric. Exp. Sta., Columbus]

432 Wiese, A. F. and Rea, H. E. **Preliminary results with 2,3,6-trichlorophenylacetic acid for eradicating perennial weeds.** *Proc. 15th N. Cent. Weed Contr. Conf.* [USA] 1958, 21. [Texas Agric. Exp. Sta., College Station]

In trials in 1957, the dimethylamine salt and an amide formulation of 2,3,6-trichlorophenylacetic acid, each at rates of 5, 10, 20, 40 and 80 lb./ac., were applied to *Convolvulus arvensis* in Aug. and Nov. to *Sorghum halepense* in Aug., and to *Hoffmanseggia densiflora* in Nov. Stand counts were taken in Sept., 1958. Applications of 10 lb. or more, per ac. of the amine salt and 20 lb. or more, of the amide formulation eradicated *C. arvensis*. *H. densiflora* was eradicated by all treatments, except the amide formulation applied at 5 lb./ac. *S. halepense* was eradicated only by 80 lb. of the amine salt/ac. These herbicides had very little action on plants when applied to the foliage only.—P.J.B.

433† Crafts, A. S. and Foy, C. L. **Autoradiography of radioactive dalapon.** *Down to*

Earth 1959, **14**, No. 4, 2–6, bibl. 9, illus. [Univ. California, Davis]

434 Loli, M. R. and Schuler, J. F. Control químico de malas hierbas en cereales. [**Weed control by chemicals in cereals.**] *Bol. trim. Exp. agropec., Lima* 1958, **7**, No. 2, 8–11. [Esta. Exp. Agríc. Junín, Peru]

In the plot trial described, several chemical herbicides were tested to control weeds (listed) in wheat. As a result, the recommended treatment to control weeds other than grasses is one application of 2,4-D amine at 2500 cc/ha given when the wheat is 20–25 cm high.—E.B.O.

435† Serna, E. H. Control de malezas en áreas no cultivadas. [**Weed control in uncultivated areas.**] *Agric. trop., Bogotá* 1959, **15**, No. 7, 436–45, illus.

This paper is concerned with the control of weeds along railways, roads, in canals and pools, on airports and other uncultivated areas. In canals and pools, grass weeds were controlled, after the water had been drained, by applying dowpon at 20 kg/ha. Effective control of broad-leaved weeds was obtained by treatment with a low-volatility ester of 2,4-D, at 5–10 l., and ACPM [MCPA ?] 50 l., in water, so as to apply a total of 935 l./ha. Good control of *Eichhornia crassipes* was obtained by treatment with esteron 21 (containing 2 lb. of low-volatility ester of 2,4-D + 1 lb. of low volatility ester of 2,4,5-T per gal.) at a rate of 1 gal., and 5 gal. of ACPM, in water, making a total of 100 gal. per ha.—E.B.O.

436† Beran, F. and Neururer, J. Zur Frage der Nomenklatur und Charakteristik chemischer Herbizide. [**Nomenclature and nature of chemical herbicides.**] *Z. PflKrankh.* 1959, **66**, No. 8, 520–34. [Bundesanstalt fur Pflanzenschutz, Wien, Austria]

A classifying code is suggested for abbreviating information on herbicides. It consists of 4 numbers, the first being on a scale of 1 to 4 and the remaining numbers each on a scale of 1 to 3. The 4 code numbers give information on : (a) the type of herbicide (contact, hormone, soil); (b) its potency; (c) the range of weed plants on which it is effective (monocotyledon, dicotyledon, or both) ; (d) the type of weed (e.g. annual, perennial). Many examples are tabulated.—D.B.

437† Department of Agriculture, New Zealand. **Control of weeds.** *Rep. Dep. Agric. N.Z.* 1959, 33.

The most promising new development on the control of weeds in crops has been the successful use of monoxone at about 15 lb. per acre against weeds in brassica crops (turnips, swedes, chou moellier). White-fleshed turnips appear the most susceptible of these crops to monoxone. Many of the common broad-leaved weeds of brassicas are successfully controlled, though *Chenopodium album* is one of the resistant species. The troublesome weeds redshank (*Polygonum persicaria*) and redroot (*Amaranthus retroflexus*) are, however, susceptible to monoxone. Both from the ground and with aerially applied chemicals, work on sweet brier has shown that basal applications of 2,4,5-T oil concentrate in diesel fuel oil (1 : 80) give good results, as do repeated overall sprays of 2,4,5-T. The most promising treatment has been the aerial application of 3·6 lb ac. a.e. of 2,4,5-T followed by basal application of 2,4,5-T in diesel fuel oil. This latter treatment is rendered more efficient once the overall spraying has opened up the brier. In practice this method is, however, limited because in most cases it is too expensive for the low-value land typically infested with the weed.—M.H.

438† Parham, J. W. **The weeds of Fiji.** *Bull. 35 Dep. Agric. Fiji.* 1958, pp. 202, bibl. 44, illus., 5s. [Received August, 1959]

Notes on the distribution of the weeds of Fiji and a key for their identification are given. Each weed is described, the commoner weeds illustrated by line-drawings and methods of dispersal mentioned. References to these weeds in publications of the Fiji Department of Agriculture and in early Floras are listed. [See also *Fld Crop Abstr.* 11 : 355]—S.M.J.

SURVEYS AND LAND USE

SURVEYS

439† Collier, J. Les paysannats du Nord-Sankuru (Territoires de Lodja et de Katako-Kombe). [**The peasantry in northern Sankuru (Territories of Lodja and Katako-Kombe, Belgian Congo).**] *Bull. agric. Congo belge* 1959, **50**, No. 3, 569–648, bibl. 7, illus., Flemish summary.

Information is given on the environment and agriculture of this region.—E.B.O.

440† van Wambeke, A. Carte des sols et de la végétation du Congo belge et du Ruanda-Urundi. Notice explicative. 13. Région du Lac Albert. [**Map of soils and vegetation of the Belgian Congo and Ruanda-Urundi. Ex-**

planatory note. 13. Lake Albert region.] *Publ. INÉAC* 1959, pp. 50, bibl. 8, 2 maps.

Information is given on the environment, soils and land use of an area of 50,000 ha (660–1200 m.a.s.l.) which was surveyed with a view to establishing populations from neighbouring high-mountain areas. The principal grass species present are listed. Maps of soils and land utilization (scale 1/100,000) are given. There are areas suitable for grazing and for annual crops.—E.B.O.

441† Department of Agriculture, Nyasaland Protectorate. **Ecology.** *Rep. Dep. Agric. Nyasald 1957-8 Pt 2*, Zomba, 1959, 140–53, 2 maps.

The results of a land-use soil survey of an area of 12 sq. miles in the Lilongwe district are described, with reference to suitability for arable crops and grazing, and to bush encroachment. Surveys of the Bwanje valley, Rivi Rivi farm and Lambulira village are also described.—A.M.H.

442 Miller, E. V. **Agricultural Ecuador.** *Geogr. Rev.* 1959, **49**, No. 2, 183–207, bibl. 26 in text, illus., maps 4. [Olin Mathieson Internat. Corp., New York City]

Ecuador possesses both tropical regions and cool highlands, and a wide range of crops may therefore be grown. The arid regions along the S. and W. margins of the country cannot be cultivated without irrigation. The tropical forest area around Guayaquil supports a rather large population of subsistence farmers whose main crops are cassava, bananas, rice, maize and cotton. In the paramo grassland area, at high altitudes in the Andes, the upper limit of crop cultivation is reached, and broad beans, potatoes and barley are the principal crops. Below the line of the paramo grasslands in N. Ecuador, more intensive cultivation is possible, and barley, wheat, potatoes and maize form the principal crops. Grain is less intensively cultivated than potatoes, which respond well to manuring. Between 1951 and '54 the production of potatoes was more than doubled, but that of wheat scarcely increased. The Indian peoples grow *Oxalis, Tropaeolum* and *Ullucus* spp. for their tubers, *Arracacia* sp. for its edible roots and broad beans and *Chenopodium* sp. for their seeds. In the warmer intermontane basins of the Sierra, maize and broad beans are grown, with lesser amounts of rye and lentils. Lowland rice is grown in the Guayas delta, and cotton in Manabí province.—R.B.

443† Idia. Informe agropecuario de la provincia de Mendoza. [**Agricultural and livestock report on the province of Mendoza (Argentina).**] *Idia* 1959, No. 140, 1–114, bibl. 44, illus. [Centro Regional Andino]

Information is given on the climate, soils, vegetation, irrigation and agriculture of the province of Mendoza.—E.B.O.

444† Rey, P. L'interprétation des photographies aériennes. [**The interpretation of aerial photographs.**] *Bull. Serv. Carte phytogéog.* (A) 1957, **2**, No. 1, 5–44, bibl. 25, illus. [Received June, 1959]

This article defines the basic elements of the method established by the Service de la Carte Phytogéographique for interpreting aerial photographs.—E.B.O.

LAND USE

See also Abs. 510, 521.

445† García, C. F. Plan de transformación de Tierra de Campos. [**Plan for improving the Tierra de Campos (Spain).**] *Agricultura, Madr.* 1959, **28**, No. 328, 443–9, illus.

This article is concerned with the agricultural improvement of a region of about 450,000 ha in northern Spain.—E.B.O.

446 Hecq, J. and Lefebvre, A. Éléments de la production agricole au Bushi (Kivu, Territoire de Kabare). Recherche de la superficie nécessaire par famille. [**Elements of agricultural production in the Bushi (Kivu, Kabare Territory). Investigation on the area required per family.**] *Bull. agric. Congo belge* 1959, **50**, No. 2, 285–94, bibl. 13, illus., Flemish summary. [Sta. Rech. Agron. INÉAC, Mulungu, Belgian Congo]

LAND RECLAMATION

447 Delmas, J. Recherches sur la mise en valeur des sols sableux des Landes de Gascogne. [**Investigations on the improvement of the sandy soils of the Landes of Gascony (France).**] *Rep. World Congr. agric. Res., Rome*, 7–9 May, 1959, 1079–83, bibl. 5, English, German, Spanish and Italian summaries. [Sta. Agron. Sud-Ouest, Pont-de-la-Maye, Gironde]

There is a project for bringing under cultivation wide areas in the Landes of Gascony, now under natural vegetation. Results from trials since 1954 have shown that by the improvement measures described, yields from hybrid maize have exceeded 6000 kg dry grain per ha.—E.B.O.

448† Fitton, A. H. and others. **Experiments on rehabilitation of opencast coal sites.** *Exp. Husb.* 1959, No. 4, 58–73.

Results are given of experiments, conducted in various centres in the North and Midland regions of England. They include drainage of newly restored land, subsoiling and deep ploughing before cropping with cereals, organic manuring for cereals, manuring with N and P for obtaining satisfactory establishment of grass and clover after reseeding.—D.B.

449† Smith, S. T. and Malcolm, C. V. **Bringing wheatbelt salt land back into production.** *J. Dep. Agric. W. Aust.* 1959, **8**, No. 3, 263–7, illus.

In reclaiming salt-affected land, the soil surface is maintained in a roughened condition to permit the entry of water, and careful grazing control is exercised. Severely-affected saltland may require a long period of annual cultivation and resowing before annual pastures and crops can be established successfully. The culture and feed-value of 3 salt-tolerant perennial plants, *Kochia brevifolia*, *Atriplex nummularia* and *A. semibaccata*, suitable for use in reclaiming salt land, are discussed.—S.M.J.

FARMING SYSTEMS AND PRACTICES

See also Abs. 442.

450 Schmid, A. R. and others. **Effect of various meadow crops, soybeans and grain on the crops which follow.** *Agron. J.* 1959, **51**, No. 3, 160–2, bibl. 6. [Minnesota Agric. Exp. Sta., St. Paul]

The results of 4 crop-rotation experiments in which the effects of 1 or 2 yr of grass and/or forage legumes, soyabeans, wheat, or oats on the yields of following crops are given. N was the most important single factor influencing the yields of maize and wheat following grain, meadow crops and soyabeans. One- and 2-yr. meadows containing legumes fixed considerable quantities of N. Crops following a legume stand showed no response to fertilizer N during the first yr. Yields of maize in the first but not in the second year following soyabeans were 15 bu./ac. higher than those of maize following oats. Birdsfoot trefoil and lucerne were equally effective in increasing the yields of following maize crops. Wheat following grass yielded worse than wheat following wheat, oats or lucerne, whether or not N was applied to the wheat. F. s.—R.B.

451 Morgan, W. B. **Agriculture in southern Nigeria (excluding the Cameroons).** *Econ. Geogr.* 1959, **35**, No. 2, 138–50, bibl. 12. in text, maps 1.

Six systems of cultivation are employed in southern Nigeria, viz. (a) shifting cultivation, (b) rotational bush fallow, (c) rotational planted fallow, (d) continuous cropping using manures, compost or household refuse, (e) tree cultivation, and (f) cultivation of flood lands. Systems (a), (b) and (c) are most commonly used. There are 2 or more rainfall maxima in most years, and 2 crops per year may be grown in some areas. Plantains [*Musa sapientum* var. *paradisiaca*], cocoyams [*Colocasia antiquorum*] and yams, with occasional cassava and maize, are grown under shifting cultivation. Under system (b), areas with grass fallow produce a greater variety of crops than do areas with woody fallow. A typical rotation in areas where cereals are the dominant crop is : 1st yr, yams (occasionally cotton or groundnuts) ; 2nd yr, maize, guinea corn, [*Sorghum vulgare*], and early and late bulrush millet [*Pennisetum typhoideum*]; 3rd yr, millet and guinea corn ; 4th yr. cassava, sweet-potatoes and beans ; 5th–8th yr, fallow. Occasionally as many as 5 different crops may be grown together in a single plot. In other grass fallow areas, root crops, especially yams, predominate. Maize, guinea corn, benniseed [*Sesamum indicum*], bulrush millet, cowpeas, groundnuts, beans and cassava are also grown. In woody fallow and planted fallow areas, yams, maize, cocoyams and cassava are the principal crops, with beans, cowpeas, cotton and occasionally upland rice as subsidiary crops. Rice, sweet-potatoes, cassava and maize are grown on land subject to periodic flooding. Yields of field crops on manured, continuously-cropped land (d) are often high. Yam yields of 10,273 lb./ac. and cassava yields of 11,141 lb./ac. have been recorded. —R.B.

452† Bašmakov, N. I. **[Farming systems in western Kazahstan.]** [Russian] *Zemledelie* (*Agriculture, USSR*) 1959, **7**, No. 5, 12-17.

Western Kazahstan is divided into 3 natural zones, namely, (1) an area to the north which is suitable for grain production and animal husbandry (average annual precipitation 250–90 mm) ; (2) a central area, comprising 4 administrative regions, where a system of crop rotation and some animal husbandry are practised (precipitation 220-50mm); and (3) an area in the south (precipitation 180–200 mm) which comprises semi-desert and is suitable only for animal husbandry. The characteristics and potentialities of these zones are described.—M.H.

453† Department of Agriculture, Nyasaland Protectorate. **Rotations.** *Rep. Dep. Agric. Nyasald 1957-8 Pt 2*, Zomba, 1959, 66–72.

At Chitedze, Pelican soyabeans were inferior as green manure to either velvet beans [*Stizolobium atropurpureum*] or sunnhemp [*Crotalaria juncea*]. On plots returned to arable cultivation after 5 years under unfertilized Rhodes grass [*Chloris gayana*], ox ploughing gave higher maize yields than tractor

ploughing or hand cultivation, in the absence of fertilizers. With fertilizers the differences between cultivation methods were small. Hand cultivation gave the highest groundnut yields. In a further experiment, plots established on Rhodes grass or bush grass stands which were ploughed up in March, 1956, and sown with maize, with and without fertilizers, and various unfertilized legumes in 1956/7, were again cropped with maize and groundnuts to test the residual effects of the previous treatments. Similar plots ploughed in March 1957 were also included. The fertilizer treatment of the preceding maize crop had little effect on the yield of maize or groundnuts in 1958. Where maize followed legumes, the yield was highest after a groundnut seed crop. In the first year after ploughing up the grass, the maize yield without fertilizer was 456 lb./ac. after bush grass, 1177 lb./ac. after unfertilized Rhodes grass and 1644 lb./ac. after Rhodes grass + 100 lb. ammonium sulphate/ac. Where the maize received 200 lb. ammonium sulphate/ac. yield differences were small. Groundnut yields ranged from 837 lb./ac. after fertilized Rhodes grass to 905 lb./ac. after bush grass. At Makanga, ridging had no effect on cotton yields when compared with flat cultivation. Mulching significantly increased yield. The production costs of a 100-ac. mixed farm unit at the Bvumbwe Agricultural Experiment Station and the rotations used are described.—A.M.H.

454 Kondo, G. and others. **Studies on the improvement of upland farm cropping. 3. Growth and yield of succeeding winter crops as influenced by the kind of preceding summer crops. 4. [Growth of winter crops when grown in pots on soil in which different preceding summer crops had been cultivated.]** [Japanese] *Proc. Crop Sci. Soc. Japan* 1958, **27**, No. 2, 249–51, bibl. 9, English summary. [Aichi Agric. Exp. Sta.]

In field experiments, the best summer crops to precede wheat, naked barley, rape and common vetch grown as winter crops were, in this descending order: groundnut, millet, upland rice and sweet potato. Pot experiments gave results similar to the field experiments. F. Eng. s.—D.B.

455 Clement, C. R. **The comparative significance of water-stable aggregation and the nitrogen status of the soil as factors in crop production following diverse leys.** *Ph. D. Thesis, Univ. Reading* 1958, pp. 211, illus., bibl. in text.

Studies were carried out at the Grassland Research Institute, Hurley, to determine the effect of 3- and 4-year leys on the organic-matter content of an arable soil and also to evaluate the relative importance of the changes in soil crumb stability and N status brought about by such leys, as factors influencing the yield of winter wheat, grown after the leys were ploughed in autumn. Increments of soil carbon in the top 6 in. of soil ranged from 0·15% where all herbage was cut and removed, to 0·2% where the leys were grazed by sheep. Most of the organic-matter increment of soils under leys was confined to the top 2 cm of soil, while the stable soil crumb structure under 3-year leys extended to a depth of a few cm only, compared with a depth of about 30 cm under permanent pastures. Soils under 3-year grazed leys contained an average of over 50 ppm. mineral N, as determined by incubation procedures, compared with 25–35 ppm. N under 1-year leys or annual tillage. In studies of wheat grown on soils previously under old pasture or annual tillage, there was no evidence that disparities between the physical condition of the soils affected the development of the wheat plants and it was concluded that variations in the water-stable aggregation of soils had no appreciable effect on wheat yields. Variations in the N status of soils, as determined before ploughing-up, were, however, closely correlated with both the relative order of yields of winter wheat ($r = 0{\cdot}88$) after the various cropping sequence and the relative response of grain yields to spring top-dressings of N ($r = 0{\cdot}8$).—P.J.B.

456† Farming in South Africa. **Experiments with grass leys in Natal give interesting results.** *Fmg in S. Africa* 1959, **35**, No. 4, 9. [Ukulinga Exp. Sta., Pietermaritzburg]

The effects on soil-carbon content and crumb structure and on subsequent maize yields of 2-, 3- and 4-yr. grass leys were compared with those of continuous maize production. The grasses used were weeping love-grass (*Eragrostis curvula*), Rhodes grass (*Chloris gayana*) and Napier grass (*Pennisetum purpureum*). The 4-yr. ley increased water-stable aggregate content 147% and organic-matter content by 22%. The maize yield in the second season following a 4-yr grass ley was 32% higher than that from a system of continuous annual maize production (26·14 compared with 19·78 bags/morgen) [1 morgen = 2·12 ac.] F. s.—S.M.J.

457 Department of Agriculture, Nyasaland Protectorate. **Irrigation.** *Rep. Dep. Agric. Nyasald 1957-8 Pt 2*, Zomba, 1959, 125–31.

The comparative values and initial performance of various crops, including wheat, linseed, maize, potatoes, lucerne, cotton, soyabeans, kenaf [*Hibiscus cannabinus*] and sunnhemp [*Crotalaria juncea*], grown on the pilot irrigation project at Makanga, are described. Leaf-area measurements were made on cotton and showed that leaf-area increase was much quicker than in Uganda and a much higher leaf-area index was reached, especially under irrigation.—A.M.H.

458 †Soares, R. N. G. Irrigação por aspersão. [**Sprinkler irrigation.**] *Agronomia, Rio de J.* 1958, **16**, 47–73, bibl. 17, illus.

For Pt 1 see *Fld Crop Abstr.* 12 : 445.—E.B.O.

459 Robertson, G. W. and Holmes, R. M. **Estimating irrigation water requirements from meteorological data.** *Publ. 1054 Canada Dep. Agric.* 1959, pp. 11, bibl. 5. [Pl. Res. Inst., Cent. Exp. Fm, Ottawa, Ontario]

460 Hallgren, G. and Johansson, W. Om spridningsjämnhet och avdunstningsförluster vid bevattning. [**On evenness of diffusion and evaporation losses in irrigation.**] *Grundförbättring* 1958, **11**, No. 1, 49–65, bibl. 2. [Inst. agron. Hydrotek, K. LantbrHögsk., Uppsala, Sweden]

In trials with the so-called slow sprinkler (aperture 6 mm) and the type formerly in general use, the so-called rapid sprinkler (aperture 14 and 12 mm), one type was used in 8 trials and both types were used simultaneously in 4 trials. The arrangement of sprinklers at the angles of a triangle and in rectangular form was also tested. The following are among conclusions reached. Irrespective of the type of sprinkler used, evaporation losses were considerably greater by day than by night. Under unfavourable circumstances (strong wind, high temperature and low relative humidity), losses under daytime irrigation amounted to as much as 30%, while under irrigation by night they were generally small, often $<5\%$. Under both night-time and, in particular, daytime irrigation, evaporation losses were greater for the slow than from the rapid type of sprinkler. It was necessary to use the slow sprinkler at night only if the best use was to be made of the water employed. All sprinkler types in current use were relatively unsatisfactory in terms of evenness of distribution. The careful arrangement of several sprinklers was able to eliminate this unevenness. Where the distance between sprinklers was large, a triangular arrangement gave the best distribution, but with smaller distances a rectangular arrangement was equally effective. With the types of sprinkler at present available, it was concluded that it was hardly possible to obtain a satisfactory water distribution without over-irrigating to the extent of 50–60%.—G.M.R.

461 Tillett, E. R. and Saunder, D. H. **Soil moisture relationships of some Rhodesian soils.** *Rhod. agric. J.* 1959, **56**, No. 2, 61–4, bibl. 5, illus.

Data obtained for soil moisture constants on some Rhodesian soils are given with particular reference to field capacity and wilting point.—Author's summary.—C.L.S.

462† Bryan, B. B. and Thomas, E. L. **Distribution of fertilizer materials applied through sprinkler irrigation systems.** *Bull. 598 Ark. Agric. Exp. Sta.* 1958, pp. 12, illus.

463† Cooke, G. W. **Fertilizers, crop production and soil fertility.** *J. Fmrs' Cl., Lond.* 1959, Pt. 5, 50–67.

Information on the relationships between fertilizers, crops and soil in Gt Britain is brought together in simple "balance-sheet" form. Modern cereal varieties require much more N than their predecessors and a modern cash-cropping rotation consumed many times more fertilizer than the old Norfolk four-course rotation. Although leys conserve organic matter, under any system of management for production they lose more potash than is lost by arable cropping. The use of N and K has increased five-fold in the last 20 years and it is concluded that crop production can be raised profitably to still higher levels by the use of fertilizers as a supplement to good husbandry.—J.D.J.

464† French, R. A. **Drainage and economic development of Poles'ye, U.S.S.R.** *Econ. Geogr.* 1959, **35**, No. 2, 172–80, 5 maps. [Univ. Coll., London]

Before drainage of the Pripet Marshes was begun in 1872, 16·5% of the area was grassland and 15·8% was arable. Rye, oats, millet and potatoes were the principal crops. By 1905, buckwheat had replaced millet, the area under arable farming had increased to 16·5%, and that under meadow and pasture to 18·5%. Flax and hemp were introduced on newly-reclaimed land. At present, less than 20% of the area is arable land, of which 9% is under flax and hemp and 25% under potatoes. High yields of crops are obtained on the drained areas. The number of livestock has greatly increased in recent years.—R.B.

465 Kyurkchiev, M. **Co-operative farming in Bulgaria.** *World Crops* 1959, **11**, No. 6, 220–1.

466 Kitching, H. W. **How agriculture is being mechanised in Libya. A story of gradual introduction of modern dry-land farming methods and machines.** *Publ. FAO/59/8/5887* 1959, pp. 4.

467 Terra, G. J. A. **Agriculture in economically underdeveloped countries, especially in equatorial and subtropical regions.** *Neth. J. agric. Sci.* 1959, **7**, No. 3, 216–31, bibl. 28, illus.

The causes of low productivity in tropical and subtropical agriculture are discussed.—R.B.

SOIL AND WATER CONSERVATION

See also Abs. 527.

468† Sirimane, C. H. L. **Land classification in Ceylon with reference to basic conditions of soil and water conservation.** *Trop. Agriculturist* 1958, **114,** No. 1, 29–37.

469† Morland, R. T. **Erosion survey of the Hume catchment area. 3. Vegetation.** *J. Soil Conserv. N.S.W.* 1959, **15,** No. 1, 66–99, bibl. 7, illus.

Notes are given on climate, topography, geology, soils, land use, extent of fire- and erosion-damage, for 3 vegetational formations of the lower parts of the catchment area. Distribution of different vegetation units over the area are correlated with each other. [See also Fld Crop Abstr. 12 : 1598.]—s.m.j.

470 Poljakoff-Mayber, A. **Germination of the seeds of *Saccharum aegyptiacum* Willd.** *Bull. Res. Coun. Israel* (*D*) 1959, **7D,** No. 2, 93–4, bibl. 3. [Hebrew Univ., Jerusalem]

In an attempt to utilize this species for the control of erosion in Israel, it was found impossible to propagate the plant by seed which does not germinate under natural conditions of the coastal plain of that country. Dehusking improves germination but is inconvenient in practice. An effective presowing treatment is to soak the caryopses for 24 hr in water under continuous light at 37°C. and subsequently dry them at room temperature.—m.h.

471† Burger, S. W. and Pazzi, J. J. O. **Earth dam walls must be protected.** *Fmg in S. Afr.* 1959, **35,** No. 7, 22–3.

It is recommended that densely growing grasses, e.g. *Panicum repens, Typha latifolia* or *Phragmites communis,* should be planted below the waterline and kikuyu grass (*Pennisetum clandestinum*) or quick grass (rooikweek) *Hemarthria altissima*) along and above the waterloine to protect earth dam along and above the waterline to protect earth dam walls against wave action. Where climatic conditions and soil characteristics prevent the use of vegetation a layer of gravel 9–12 in. thick should be used.—s.m.j.

472† Samson, J. A. **Easier forest clearing.** *World Crops* 1959, **11,** No. 8, 273–4, illus.

The use of kudzu (*Pueraria phaseoloides*), as a cover crop following forest clearing by chemical methods in tropical areas with high rainfall, is described. The leaves of kudzu, which contain 18% protein, can be strip-harvested for fodder.—s.m.j.

AGRO-METEOROLOGY AND CLIMATOLOGY

See also Abs. 28, 138, 288, 328, 522.

473 Moldenhauer, W. C. and Westin, F. C. **Some relationships between climate and yields of corn and wheat in Spink county, South Dakota, and yields of milo and cotton at Big Spring, Texas.** *Agron J.* 1959, **51,** No. 7, 373–6, bibl. 14. [S. Dakota Agric. Exp. Sta., Brookings]

Summer temperatures influenced crop yields to a much greater extent than did summer rainfall. Variability in spring wheat yield between 1926 and 1952 was most closely associated with average maximum June temperatures and that of maize during the same period with average maximum July temperatures. Variability in yields of milo [*Sorghum vulgare*] during 1915–54 were most closely correlated with variability in seasonal precipitation before sowing, and those of cotton with variability in mean July and Aug. temperatures. Temperatures during July and Aug. were correlated with preceding rainfall at both locations. F. s.—r.b.

474 Hyre, R. A. **The relation of rainfall and temperature to late blight of potato at Burlington Vermont.** *Pl. Dis. Rptr* 1959, **43,** No. 3, 295–7, bibl. 5. [Crop Res. Div., U.S. Dep. Agric., Newark, Delaware]

475† Primault, B. Les répercussions du temps sur la lutte antiparasitaire. [**The indirect effects of climate on the control of parasites.**] *Rev. rom. Agric.* 1959, **15,** No. 6, 49–51, bibl. 5. [Inst. Suisse de Météorologie]

This advisory article deals with the factors of air temperature, air humidity, rain, turbulence and wind as they affect the application of insecticides and fungicides, as powders or sprays. From a study of diurnal variations in these factors in Switzerland, it is recommended that (in Switzerland) powders should be applied in the evening and spraying done in the early morning, or in the evening.—d.b.

476 Šaško, D. I. [**Agro-climatic indices of growth stages in crops.**] [Russian] *Vestn.*

S-H. Nauki (*J. agric. Sci. USSR*) 1959, **4**, No. 4, 96–109, bibl. 12, English, French and German summaries.

477† Gregory, S. **Climate and water supply in Great Britain.** *Weather* 1959, **14**, No. 7, 227–32, illus. bibl. 12.

478† Antezana, P. O. Climas de Bolivia según el sistema de Thornthwaite. [**Climates of Bolivia according to the Thornthwaite system.**] *Rev. Fac. Agron., La Plata* 1958, **34**, No. 2, 161–91, bibl. 26, illus., English summary.

An attempt is made to apply the Thornthwaite classification to the climate of Bolivia (10°–22° S lat., 200–4000 m.a.s.l.). Agreement was found with the natural vegetation types at low latitudes. A map shows the phytogeographical regions of the country.—E.B.O.

479† Ibarra, C. A. El micro-clima de Palmira y sus características principales. [**The micro-climate of Palmira and its principal characteristics.**] *Bol. téc. 3 Minist. Agric. Colombia* 1958, pp. 111, bibl. 9.

This publication summarizes meteorological data recorded since 1930 at the Palmira Agricultural Experiment Station (250 ha, 3°N lat., 76°W long., 1006 m.a.s.l.) in the Cauca Valley, Colombia. The climate is tropical with 2 dry and 2 rainy periods.—E.B.O.

480† Unesco. **Arid Zone Research, 11. Climatology and micro-climatology.** *Proc. Canberra Symp., Oct., 1956*, 1958, pp. 355, bibl. at end of chapters, illus. Paris UNESCO, 9 × 22 cm, 55s. ; $11.

See also *Herb. Abstr.* 28 : 1270. This symposium was organized by UNESCO jointly with CSIRO. The papers were grouped into 8 sessions, 3 of which were : The inter-relationships of climatic elements and flora ; The modification of microclimate ; and The requirements of climatological observations in arid zones.—M.H.

MISCELLANEOUS

481† Chaîne, G. Problèmes agricoles sur les bords septentrionaux du Bassin méditerranéen. [**Agricultural problems in the countries on the northern shores of the Mediterranean.**] *Ann. Géogr.* 1959, **68**, No. 368–, 318–32.

482 Panse, V. G. **Status of agricultural experiments.** *Publ. FAO* 1958, pp. 67.

This is a review based on the results of an inquiry undertaken by FAO in 1954 in countries of the Far East, south-east Asia and Middle East. The main conclusion drawn is that in agricultural experimentation, replication and randomisation are universally used and modern statistical designs are extensively adopted. Greater attention should, however, be given to the various factors which contribute to the efficiency of experiments. The need is stressed for a much greater amount of experimentation on rice, the major food crop of many countries. More experiments on leguminous and tuber crops are also necessary.—E.B.O.

483† Hallett, G. **An introduction to farm management analysis. 1957/58 supplement.** [1959], pp. 24, Department of Agricultural Economics, University College of Wales, Aberystwyth.

See Fld Crop Abstr. 12 : 1616.

484 Haughs, M. A. and others. **Enterprise cost series 1958. Crop costs.** *Econ. Rep.* **81** *N. Scot. Coll. Agric., Agric. Econ. Dep.* 1959, pp. 11. [**North of Scotland College area**]

The costs of production of oats, potatoes and turnips are given.—S.M.J.

485† FAO **The state of food and agriculture 1959.** Rome, 1959, pp. 197, bibl. in text.

486† Ministry of Agriculture, Thailand. Division of Agricultural Economics. **Agricultural statistics of Thailand for 1957.** Bangkok, 1958, pp. 158.

487 Draisma, M. Het produktieniveauonderzoek. I. Teelt en bemesting op bouwland in de praktijk. [**Yield survey. 1. Cultivation and fertilization of field crops as practised in the Netherlands.**] *Versl. Landbouwk. Onderzoek.* 64.9, 1958, pp. 168, bibl. 11, English summary, 143–5. [Proefst. Akker. Weidebouw, Wageningen]

Data are given of the cultivation and manurial treatments applied to the major arable crops in the Netherlands, as shown by the results of random sampling on 3400 fields throughout the country.—G.M.R.

488 Mare, P. H. Le. **Soil fertility studies in three areas of Tanganyika.** *Emp. J. exp. Agric.* 1959, **27**, 107, 197–221, bibl. 22. [Namulonge, Uganda]

The results of over 200 field experiments on soil fertility problems in the Southern, Central and Western Provinces of Tanganyika are summarized. Crops used were mainly groundnuts or maize, but sunflower, sorghum, soyabean, and safflower were also included. With maize, grain yields increased with successive increments of P up to 30 lb. P/ac. (as P_2O_5). Groundnuts did not respond to $(NH_4)_2SO_4$. The soils of all areas have adequate K for most crops. F. s.—s.m.j.

489 Azzi, G. Il rendimento nelle più svariate condizioni di ambiente. Rendimenti e scarti. Reciprocità di effetti in fattori accoppiati : attenuazione, bilanciamento, accentuazione. Gruppi di fattori a duplice effetto positivo e negativo in relazione al danno prodotto dalla siccità. Analisi degli effetti delle varie combinazioni fattoriali sul "concime". [**Yield in varied environmental conditions. Range of yields. Reciprocity of effects in coupled factors : attenuation, balance, accentuation. Groups of factors having a two-fold, positive and negative, effect in relation to the damage caused by drought. Analysis of the effects of the various factorial combinations on "manure".**] *Ann. Fac. Agr., Perugia* 1958, **13**, 88–115. [Ist. Ecol. Agr., Univ. Perugia, Italy]

The author illustrates his method for measuring the increase (or decrease) in crop yield determined by an environmental or agrotechnical factor, as a function of all other factors which influence yield. In the example given, the yield of the wheat var. Mentana was determined in all combinations of the following 9 factors, 5 of which were stable: soil (good or poor), topography (level or not level), cultivation (35–40 cm or 15 cm deep), manuring (manured or unmanured), preceding crop (improving or exhausting), and 4 were variable: drought, rust, lodging and "shrivelheads".—e.b.o.

490 Barber, S. A. **Relation of fertilizer placement to nutrient uptake and crop yield : 2. Effects of row potassium, potassium soil-level, and precipitation.** *Agron. J.* 1959, **51**, No. 2, 97–9, bibl. 6. [Purdue Univ. Agric. Exp. Sta., Lafayette, Indiana]

Broadcast applications of KCl to maintain soil K levels at 110, 150 or 300 lb. exchangeable K_2O/ac., or row applications at 0 or 25 lb. K_2O/ac. for maize, and 0 or 75 lb./ac. for wheat, significantly increased the K content and yield of maize and the K content of wheat. The residual effects of both types of application significantly increased yield and K content of soyabeans. In a supplemental experiment, row or broadcast applications were equally effective for maize. For both maize and soyabeans, the response to K was positively correlated with precipitation during the growing season.—a.m.h.

491 Mallamaire, A. **Control of weaver bird in West Africa.** *Pl. Prot. Bull.* 1959, **7**, No. 8, 105–12, illus. [Serv. Prot. Vég., Dakar, Sénégal]

A review is made of methods for controlling birds of the genus *Quelea*, which cause serious losses to cereal crops in Africa. It is concluded that the use of fire and explosives is obsolete. The application of poisons such as parathion, phosdrin and dinitro-orthocresol, by aeroplane or helicopter, is a rapid and economical method which ensures eradication over large areas. Phosdrin, 25% concentration at 20 kg/ha, does not require prolonged supervision of the treated sites as is the case with parathion. Dinitro-orthocresol, 10% solution at 300 kg/ha is effective against *Quelea* spp. and has herbicidal and insecticidal properties as well, but is toxic to humans and mammals. [See also *Fld Crop Abstr.* 11 : 1319.]—e.b.o.

492† Lindström, O. **Fungicide distribution and disinfection efficiency in seed treatment.** *J. agric. fd Chem.* 1959, **7**, No. 5, 326–9, bibl. 10. [AB Casco, Stockholm 11, Sweden]

493 Sijpesteijn, A. K. and others. **Investigations [with peas and beans] on the activity of pyridine-2-thiol-N-oxide as a systemic fungicide.** *Meded. LandbHogesch. Gent* 1958, **23**, Nos. 3 and 4, 824–30, bibl. 7, illus. [Inst. Organic Chem. T.N.O., Utrecht, Netherlands]

REPORTS

494 **Belgium.** Rijkslandbouwhogeschool, Gent. Centrum voor Onkruidonderzoek. Beknopt verslag over onderzoekingen in 1958. [Weed Research Centre, State College of Agriculture, Ghent. Condensed report on research in 1958.] Gent [n.d.], pp. 30, mimeo.

This reports the first year's activities of the new Belgian Weed Research Centre. See Abs. 92, 187, 198, 240, 243, 257, 270, 286. —r.b.

495 **Switzerland.** Stations Fédérales d'Essais Agricoles, Lausanne. Rapport d'activité 1957. *Landw. Jahrb. Schweiz* 1958, **72**, 255–413

496 **Switzerland.** Tätigkeitsbericht der Eidg. Landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon über das Jahr 1957. [Report of activities of the Federal Agricultural Research Institute, Zürich-Oerlikon for 1957.] *Landw. Jahrb. Schweiz* 1958, **72**, 575–651.

497 **Tanganyika Territory, Eastern Province.** Empire Cotton Growing Corporation. Progress Reports from Experiment Stations. Season 1957–58. London 1959, pp. 18. [Received September, 1959]
See Abstract 324.

498 **Tanganyika Territory, Lake Province.** Empire Cotton Growing Corporation. Progress Reports from Experiment Stations. Season 1957–58. London, 1959, pp. 20. [Received September, 1959]
See Abstract 352.

499 **Southern Rhodesia.** Gwebi Agricultural College. Progress report on field crop experiments 1954/5 to 1956/7. *Rhod. agric. J.* 1959, **56**, No. 1, 13–19, bibl. 10.
See Abstracts 5, 111, 275.

500 **Nyasaland Protectorate.** Annual Report of the Department of Agriculture for the year 1957–8, Part 2. Zomba, 1959, pp. 155.
See Abstracts 110, 235, 441, 453, 457.

501† **Federation of Rhodesia and Nyasaland.** Secretary to the Federal Ministry of Agriculture. Report for the year ended 30th September, 1958. Salisbury, 1959, pp. 221, 10s. 6d.
See Abstracts 91, 95.

502 **Basutoland.** Department of Agriculture. Annual report for the year 1958. Maseru, 1958, pp. 106, illus.
See Abstract 77.

503 **Sierra Leone.** Department of Agriculture. Annual report for 1957. 1959, pp. 42.
See Abstract 234.

504 **Canada.** Department of Agriculture and Marketing, Province of Nova Scotia. Report for the year ended March 31st 1958. Halifax, N.S. 1958, pp. 40.
See Abstract 196.

505† **United States.** Proceedings of the 15th North Central Weed Control Conference, 1958, pp. 146.
See Abstracts, 88, 89, 100, 118, 217, 218, 315, 410, 420, 428, 429, 430, 431, 432.

506 **New Zealand.** Canterbury Agricultural College, Lincoln, Annual review for year ending 30 June, 1959, pp. 118.
See Abstract 214.

507 **New Zealand.** Department of Agriculture. Report for the year ended 31 March, 1959, H.29, 1959, pp. 174.
See Abstract 437.

508† **International.** Report of the tenth FAO Hybrid Maize Meeting held in Madrid, Spain, 22–27 Sept., 1958. *FAO/58/10/8210* 1958, pp. 29

BOOKS

509 Hogen Esch, J. A. and others. **Dutch potato atlas. Second supplement.** 1958, illus., Wageningen, Netherlands : Veenman en Zonen, 22 × 16 cm, f. 11.25, 21s., $3·00.

This second supplement of the Dutch Potato Atlas contains descriptions and illustrations of the following varieties : Ambassadeur, Avenir, Burmania, Kwinta, Luctor, Meerster, Pionier and Rival. [See *Fld Crop Abstr.* 9 : 1038 and 10 : 1675]—R.B.

510† Teixeira, A. J. da S. and Barbosa, L. A. G. A agricultura do Arquipélago de Cabo Verde. Cartas agrícolas. Problemas agrários. **[Agriculture in Cape Verde Islands. Agricultural maps. Agricultural problems.]** *Mem. Trab. 26 Cent. Invest. cient. algod.* 1958, pp. 178, bibl. 83, illus., maps, English and French summaries. [Minist. Ultramar, Lisboa, Portugal]

This publication results from an ecological-agricultural survey of Cape Verde Islands (14°–17°N. lat., 22°–25° W. long.) carried out in 1955–6, with the object of assessing their agricultural possibilities mainly with regard to cotton-growing. Information is given on the climate, soils, vegetation and land use in the 10 islands studied (total area 403,300 ha). Rainfall is generally insufficient. The original vegetation consists mainly of grasslands of the savanna type. Various types of pastures are described and plant species present are named. The recommendations made for the agricultural development of these islands (possibilities are greatest in Santiago) include : the extension of irrigation, an increase in the number of mixed farms (pastures and irrigated crops), and pasture improvement. The 10 maps given (one for each island) show : irrigated areas, pastures, and areas

suitable for cultivation. There are many good illustrations, some of them in colour.—E. B. OWEN.

511 TEMPANY, H., and GRIST, D. H. **An introduction to tropical agriculture.** 1958, pp. xvi + 347, illus., bibl. 211, 23 × 15 cm, London : Longmans, Green and Co., 40s.

512† GAUDY, M. Manuel d'agriculture tropicale. [**Handbook of tropical agriculture.**] 1959, pp. 444, Paris : La Maison Rustique.

[Review seen in *Bull. agric. Congo belge* 1959, **50**, No. 4, 1137–8]

513† HALL, C. W. **Drying farm crops.** 1957, pp. xxiv + 336, bibl. at end of chapters, illus., 22 × 15 cm., Reynoldsburg : Ohio, Agric. Consult. Assoc., $7. [Received Sept., 1959]

Research on the drying of farm crops as reported in the literature of the past 20 years has been reviewed in this book which covers both theoretical and practical aspects. Emphasis is placed on the drying of cereal grains and hay, but the principles discussed apply to other crops as well. The aim has been to compile chapters complete in themselves; thus the discussion of the theory of drying is presented separately from the practical procedures. The material of the book includes : data on equilibrium moisture content ; methods for determining moisture ; use of heated air and of forced air for drying ; fan types ; duct arrangements ; and equipment and procedures for aeration. Among the many tables given are those of equilibrium moisture contents in different materials, chemicals for maintaining constant relative humidities and data of latent heat. The problems presented at the end of each chapter improve the value of the book as a text book. There is a subject index.—E. B. OWEN.

514† DAUBENMIRE, R. F. **Plants and environment. A text book of plant autecology. 2nd edn,** 1959, pp. 433, bibl. 273, illus., 23 × 15 cm, New York : John Wiley & Sons, Inc., 56s.

The first edition was published in 1947 and reviewed in *Fld Crop Abstr.* 1 : 1354. In the new edition, it is stated that many changes have been incorporated in the text while maintaining the original plan and organization. These changes include up-to-date material on evaluation of stoniness of the soil, frost churning of soil, significance of dew for plants, new concepts on evapotranspiration, shielding of precipitation gauges, urban microclimate, and atmospheric pollution by smog and hydrogen fluoride.—D.B.

515† RUHLAND, W. [Ed.] Handbuch der Pflanzenphysiologie. Band IV. Die mineralische Ernährung der Pflanze. [**Encyclopaedia of plant physiology. Vol. 4. Mineral nutrition of plants.**] 1958, pp. 1230, bibl., illus., 25 × 17 cm, Berlin, Göttingen, Heidelberg : Springer-Verlag. £25.

Thirty authors (from Great Britain, Sweden, Denmark, Netherlands, Switzerland, E. and W. Germany, Austria and Australia) have contributed 34 papers on subjects which have been grouped into 9 parts as follows : the mineral content of plants ; methods for determining the mineral content of plants (including water-culture and tracer-element methods) ; the sources of plant mineral-substances (in soil, water and air) and their uptake by plants ; the transport of mineral substances ; the role of mineral substances (in photosynthesis, transpiration and enzyme activity) and the function and action of the individual mineral elements ; salt losses and redistribution of salts in higher plants ; the importance of mineral substances for colonization of land by plants; the mineral nutrients in crop cultivation ; the importance of micro-organisms (bacteria and fungi) for the biological cycle of mineral substances. Each contribution has its own bibliography. There is an author index, also a combined glossary and subject index in 2 parts, German/English and English/German.—D.B.

516† TURRILL, W. B. [Ed.] **Vistas in botany. A volume in honour of the bicentenary of the Royal Botanic Gardens, Kew, 1959.** xv + 547, bibl. at end of chapters, illus, 17 × 26 cm. London : Pergamon Press, £5.

This compilation of reviews is in 18 chapters, each written by specialists in the subjects considered. The following contributions are selected as being of special interest to agronomists. Causal plant ecology, by E. J. Salisbury ; Basic problems of plant sociology (in German), by J. Braun-Blanquet; Plant geography, by W. B. Turrill ; Plant physiology, by F. W. Went ; and Plant biochemistry, by E. C. Bate-Smith. The editor in his preface gives an account of the history and functions of the Royal Botanic Gardens. It is recorded that an important aspect of the service of Kew to botanical science is the supplying of materials (plants, plant parts, vegetative propagules, and seeds) to research institutions for observational and experimental purposes. Publication of botanical research is also carried out at Kew and the *Botanical Magazine* (dating from 1787 and one of the oldest scientific periodicals) has been edited continuously at Kew. The area of the Gardens is approx. 300 ac. and they now come under the Ministry of Agriculture, Fisheries and Food. The book has an index (which combines plant names and subject matter.)—M.H.

517† ROSS-GRAIG, S. **Drawings of British plants. Part 13. Umbelliferae (2), Araliaceae, Cornaceae.** Unpaginated. 30 plates. London : Bell & Sons Ltd. 1959. 9s. 6d.

518† RÜTHER, H. Die Feldversuchstechnik. [**Field-trial technique.**] 2nd edn. 1958, pp. 187, illus., Deutscher Bauernverlag, DM 8.20.

The first edition of this text book from the German Democratic Republic was published in 1952 ; it appears to have been popular, for in a relatively short time it was out of print. The second edition has been revised to take into account some recent findings of German investigators. An opening chapter provides a brief account of the historical development and importance of field trials. The following sections of the book are concerned with the organization of field trials ; the layout schemes of Mitscherlich and Lindhard, the long-plot method and new methods based on variance analysis, including block layouts, Latin square and rectangle, polyfactorial experiments and split plot designs, are described. There are also chapters, providing instruction on the marking out of plots, seed sowing, care of the crops during growth harvesting and assessing the yield and quality of the crop. The final chapter deals with the analysis of the experimental results, the recommended methods of analysis being illustrated by means of worked examples ; the reader is not expected to have great mathematical knowledge. An appendix provides mathematical tables including tables of squares, square roots, t, p and F. A short glossary of technical terms and a short bibliography conclude the volume. The text is illustrated by adequate line drawings and photographs of varying value. Unfortunately this helpful little book is printed on paper of only moderate quality. [From *Plant Breeding Abstracts*, 29, No. 3]

519† WAGNER, F. Die technische Durchführung von Feldversuchen. [**The technique of conducting field trials.**] 1959, pp. vii + 166, illus., Berlin and Hamburg : Paul Parey, DM 19.80.

This useful handbook deals fully with the practical side of field testing. The work is considered in the order in which it arises during the course of an experiment. In the first section on the planning of field trials, the layout schemes, including the Mitscherlich and Lindhard layouts, Zade's long-plot method, randomized blocks, Latin squares and rectangles and polyfactorial arrangements, are described and discussed. The following chapters are concerned with preparation of the seed and the experimental area, laying out the plots, fertilizing the soil, sowing, planting, making observations on the performance of crops during the growth period and harvesting ; special instructions are provided for testing the most important agricultural crops. The final chapter deals with the keeping of records. Being of a high standard of production, this book is pleasant to handle ; the value of the text is enhanced by the illustrations, which include neat line drawings and photographs. A short bibliography and subject index complete the book. [From *Plant Breeding Abstracts*, 29, No. 3.]

520† MOORE, W. C. **British parasitic fungi.** 1959, pp. xvi + 430, 1 map, 19 × 13 cm, Cambridge Univ. Press, 45s.

This book provides a comprehensive guide to all the parasitic fungi which have been reported on cultivated plants in Gt Britain, the diseases which they cause and the British literature on the subject. The first part of the book comprises an alphabetical list of the scientific and common names of cultivated host plants, with all the fungus parasites recorded on each host listed alphabetically under the scientific name of the host. The second part includes lists of the parasites in alphabetical order.

521† UNITED STATES DEPARTMENT OF AGRICULTURE. **Land. The yearbook of agriculture 1958.** [n.d.], pp. 605, illus., 22·5 × 14 cm, Washington : U.S. Govt. Printing Office, $2·25.

This yearbook deals with the various aspects of land use in the USA. There are sections on history, land resources, economic development, public and private lands, the pattern of farming, financial and legal aspects of land use, soil and water conservation, land-use surveying by means of aerial photography, forestry, the agricultural development of Alaska, Hawaii and Puerto Rico, agricultural output, non-agricultural land use, urban development and planning for the future.—R.B.

522† BLANCHARD, J. R. and OSTVOLD, H. **Literature of agricultural research.** 1958, pp. x + 231, 24 × 15 cm, Berkeley : Los Angeles : University of California Press, and London : Cambridge University Press, 37s. 6d.

This book is a compendium of reference and general encyclopaedic works within the whole field of agriculture and is the first of a series of bibliographic guides which are to be issued under the sponsorship of the University of California. The sections on general agriculture (pp. 3–26), botany (pp. 27–39), horticulture and agronomy (pp. 39–46), pest control (pp. 114–18), agricultural engineering and irrigation (pp. 136–9), and meteorology (pp. 139–41), are of particular interest to readers of this journal. The sections are subdivided under the following headings where these are applicable : bibliographies of bibliographies ; abstract journals and reviews ; bibliographies and indexes ; encyclopaedias ; dictionaries ; guides to nomenclature ; directories, handbooks and yearbooks ; historical, biographical and geographical works ; abbreviations ; lists of periodicals ; textbooks ; societies and organizations ; weights and measures ; conversion factors ; statistics ; classi-

fication systems. "Emphasis has naturally been placed on American publications." The most important works published outisde the USA are also cited, and are occasionally mis-spelt. The main body of the text is slightly out of date, but this is remedied by an appendix containing the most recent references. There is a good index.—R.B.

523† UNESCO. **Directory of current Latin American periodicals.** 1958, pp. xxv + 266, text in English, Spanish and French, 21 × 13 cm, Paris : UNESCO, 17s. 6d.

In this directory of publications issued by official or private bodies, the material is arranged acccording to the Universal Decimal Classification. There is a geographical and a subject index.—E.B.O.

NEWS AND NOTES

Great Britain

524 COMMONWEALTH TOUR. The Director of the Commonwealth Bureau of Pastures and Field Crops, Mr. A. G. G. Hill, left this country in early November for a 4-month tour of Africa. He expects to visit : Malta, Uganda, Kenya, Zanzibar, Tanganyika, Nyasaland, Northern Rhodesia, Southern Rhodesia, Bechuanaland, Basutoland, Swaziland, the Union of S. Africa, Nigeria and Ghana, and to return to Gt Britain at the end of February. The itineraries for Mr. Hill's journeys have been arranged by the Bureau's Official Correspondents in the countries visited. In 1956/7 Mr. Hill visited Canada, Fiji, New Zealand, Australia and Ceylon.

Netherlands

525 Four new winter cereal varieties, all of which show a considerable degree of winter-hardiness, are scheduled for inclusion in the Netherlands list of recommended crop varieties for 1960. M.G.203 winter barley makes somewhat more rapid spring growth than other similarly winter-hardy varieties. It grows quite tall but has stiff straw, ripens rather late, gives very good yields of grain and straw and is little affected by soil type. Stella winter wheat, an early-ripening variety with short, fine straw of moderate strength, tillers strongly and requires to be sown thinly. Very heavy yields of this large-grained red wheat have been obtained on all soil-types. It is resistant to sprouting in the ear and grain-shedding, but it is susceptible to yellow rust [*Puccinia glumarum*]. M.G.H.698 winter wheat makes a good cover-crop. It is a high-yielding, small-grained, late ripening red wheat with stiff, short straw, and grows best on fertile clay soils. Some sprouting in the ear may occur and grain-shedding is considerable. C.I.V. 237 winter wheat has erect leaves, gives a moderate ground cover and tolerates heavy applications of N. It grows best in the central sea-clay areas of the Netherlands and gives good average yields of white grain and has some tendency to sprout in the ear. Because of its short, stiff straw and resistance to shattering, it is well suited for combine harvesting. *Persbericht 1 Rijkscommissie voor de Samenstelling van de Rassenlijst voor Landbouwgewassen*, 15 Aug. 1959. —R.B.

Switzerland

526 The following are among the papers published in a special issue of *Schweiz. landw. MH.* 1959, **37**, No. 4/5, to mark the 60th birthday of Bundesrat Dr. F. T. Wahlen : Habitat conditions and distribution of crop plants by R. Koblet ; The effect of potassium manuring on potatoes by L. Gisiger ; The cultivation of seed potatoes, with a view to assisting the mountain populations of Valais, by J. Münster ; The importance of recognizing virus disease in seed-potato production, by E. R. Keller ; Sugar-beet cultivation in E. Switzerland, by W. Steiner ; Plant protection in arable cultivation, by R. Salzmann ; The influence of soil, soil cultivation and crop on the occurrence and germination of *Sinapis arvensis*, by A. Gysel ; The development of arable cultivation in Switzerland in the post-war period with special reference to fodder cereals, by A. Kauter.—D.B.

Algeria

527 AGRICULTURE. *Bulletin Technique d'Information* 1959, No. 142, 373–546, is devoted entirely to agriculture in Algeria, and contains the following articles, among others : Agriculture in Algeria, by R. Uhlen ; Agricultural aspects of the water problem, by G. Drouhin ; Necessity of controlling erosion. Modern methods for soil- and water-conservation, by L. Saccardy ; Evolution in cereal-growing, by P. Laumont ; The interest of industrial crops for the economic development. Possibility of extending them, by G. Piguemal ; The association cereals-sheep, by A. Grosrenaud.—E.B.O.

Israel

528 THE PROCEEDINGS OF THE BOTANICAL SOCIETY OF ISRAEL (at the 3rd Convention of Scientific Societies of the Association for the Advancement of Science in Israel, Haifa, 19–21 October, 1959) included the following papers: The calculation of crop water requirements from meteorological data under semi-arid conditions, by G. Stanhill ; Transpiration reduction by spraying with low viscosity silicones, by H. Bielorai and D. Angus ; Plant-water relationships, by E. Shmueli ; The response of corn [maize] and cotton to different soil moisture regimes, by M. Ophir and J. Putter, The effect of nitrogen supply and water regime on anatomical structure of corn [maize] and cotton leaves, by T. Arzee and Z. Glinka ; Phytotronics [plant growth, development and environment] D. Koller ; and Weed control in sugar beet fields, by M. Horowitz.—M.H.

USSR

529 ALL-UNION CONFERENCE ON SELECTION AND SEED

PRODUCTION OF COTTON. This Conference was held in Taškent during June, 1959. An account of the subjects discussed is given in *Hlopkovodstvo* 1959, No. 9, pp. 13–53, under the following heads : The present position and measures for improving selection and seed production of cotton (papers from the Uzbek, Tadžik, Kirgiz, Turkmen, Kazah, Azerbaïdžan, and Armenian Republics) ; New and effective methods for seed production of cotton ; Certain problems of cotton breeding in USSR ; New varieties of cotton and the need for mechanical harvesting ; Selection for disease resistance.—M.H.

Australia

530 Normally it is a hopeless task to try to eradicate false caper (*Euphorbia terracina*) from sandy land which is likely to drift if worked, and where the cost of herbicidal treatment is prohibitive. One farmer, faced with a dense infestation, used a combination of cultivation, a barley crop, and a lucerne cover which was heavily mown and grazed, resulting in complete eradication of the weed. *J. Dep. Agric. S. Aust.* 62, No. 12, 1959.—S.M.J.

New Zealand

531 LINCOLN COLLEGE FARMERS' CONFERENCE. The proceedings of this 9th Conference (1959) include papers on the following : Diversification of farming ; Avoidable hazards in the growing of wheat ; The importance of moisture in wheat . [See also *Herb. Abstr.* 27 : 409].—M.H.